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the news digest magazine

Volume XXIX-No. 10 October, 1956

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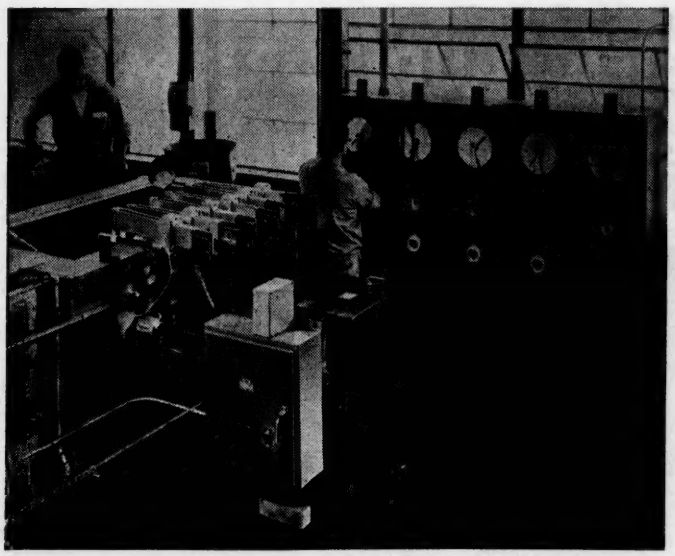

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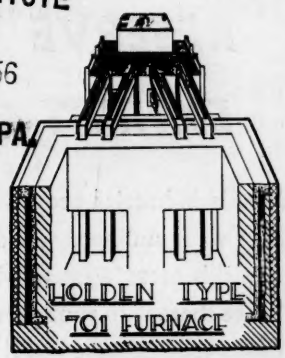

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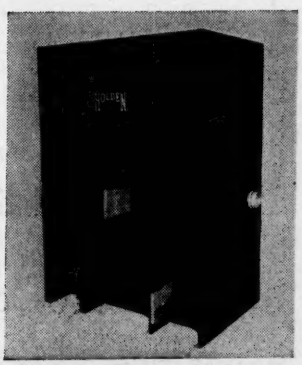

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3. All New Primaries—
   100% New Guarantee.

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THREE P.O.E. POINTS—LOS ANGELES, DETROIT and NEW HAVEN

Western Metal Exposition

PAN-PACIFIC AUDITORIUM
Los Angeles, California
MARCH 25 through 29, 1957

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Metals industries people—ready and able to buy the things they want and need to make things of metal—will be pouring into this great Western Metal Show and you'll want to be there . . . be there with your products on display and your sales staff on its toes, because you'll sell—and sell often—at this great concentration of metals industries people! Remember, more of your customers and prospects will see this Western Show than ever before!

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Metals Review

VOLUME XXIX, No. 10 October, 1956

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WESTERN METAL EXPOSITION
Pan-Pacific Auditorium
Los Angeles
Mar. 25-29, 1957

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Philadelphia Is Host to Students

A Group of Drexel Students and Professors Who Attended the Student's Night Meeting of the Philadelphia Chapter Heard Robert D. Stout, Lehigh University, Present a Report Entitled "Current Metallurgical Research". A. W. Grosvenor, head of the department of metallurgical engineering at Drexel Institute, is shown, fifth from the left, with the student group

Speaker: Robert D. Stout
Lehigh University

Robert D. Stout, professor of metallurgy, Lehigh University, presented a lecture on "Current Metallurgical Research" at Students Night meeting of the **Philadelphia Chapter.**

The field of welding research lends itself to the study of many phases of metallurgy. Many aspects of melting and solidification, cold and hot working, microstructure evaluation, and physical property evaluation are associated with welds and the heat affected zone adjacent to the welds. Dr. Stout based his discussion on current research with effects of welding on the properties of structural steels. Strength, ductility, notch toughness and fatigue strength were among major properties evaluated.

Welding generally tends to strengthen steel. This is demonstrated by the rise in hardness. Although weld metal is only slightly less ductile than the original parent metal, the heat affected zone suffers a considerable loss in ductility. With respect to fatigue resistance, it has been found that welded sections closely match unwelded plates, provided the welds are ground smooth.

Dr. Stout stressed that the notch toughness of welded structural steels is an important metallurgical consideration. When difficulty was first encountered because of weld notch sensitivity of structural steels, design and workmanship were improved, then new low carbon steels were developed. Strength was provided in these steels by use of other alloying elements.

The important criterion of notch toughness is the transition temperature of a given steel. At this temperature, a sharp drop in the amount of energy absorbed by the steel occurs. Normally a number of impact tests are made over a series of temperatures and the results plotted as a curve. A sharp change in slope is regarded as the transition temperature. These curves can be based on either the amount of energy absorbed, ductility, or fracture appearance, plotted against testing temperature. There are arguments on both sides for the use of each of these methods.

Alloying elements, cold working and heat treatment all exert some influence on notch toughness. Interstitials such as carbon, hydrogen and nitrogen tend to be harmful to notch toughness, while elements such as nickel and manganese aid toughness. Cold working tends to increase transition temperatures of steels, and when this cold work is followed by post heating at around 500° F., notch toughness is considerably impaired by strain aging. Time at temperature, cooling rate and holding temperature and their effect upon microstructure also influence notch toughness. A fine grain size will lower transition temperature, while coarse pearlite patches will raise transition temperature for a given steel.

Research efforts at Lehigh have attempted to determine the properties of the heat affected zone of welded structural steels and it has been found that although ferrite is the most ductile phase of these steels, it is also the weakest, and when other structures interfere with its flow, failure occurs. Cracks tend to form at the ferrite grain boundaries or adjacent to other phases present.

Rapid cooling of the heat affected zone causes a martensitic transformation in welded steels. The areas where mixed amounts of ferrite and martensite occur as a result of rapid cooling from between the A_1 and A_3 temperatures are referred to as intercritical areas. As impact testing temperature is raised, percentage of fibrous fracture is increased, but there persists some crystalline fracture associated with these intercritical areas, which can trigger failure.—**Reported by George Krauss, Jr., for Philadelphia.**

Receives Gavel

N. C. Fick, Incoming Chairman of the Washington Chapter, Receives Gavel From W. E. Eisenman at Its National Officers Night Dinner

Clad Metals Is Topic At Carolinas Meeting

Speaker: L. W. Williams
Colorado Fuel and Iron Corp.

"Manufacture and Fabrication of Clad Metals" was the subject discussed by L. W. Williams, consultant for the Colorado Fuel and Iron Corp., at a meeting of the **Carolinas.**

Mr. Williams explained the principal procedures for joining cladding to base metals. These are: resistance or "spot" welding of the dissimilar plates; pressure welding by rolling; casting of a bimetallic ingot, followed by rolling and trimming; and joining the dissimilar components by brazing.

One problem in fabricating the composite plates into corrosion resistant vessels is elimination of contamination of the clad by the base metal at welded joints. Contamination is minimized by adequate back chipping and multipass welding.

The remainder of the discussion centered on electroclad steels, in which a heavy nickel plate is electrodeposited on the base material. Roll forming, shearing, stamping and welding of electroclad sheets into corrosion resistant vessels was illustrated by motion pictures.—**Reported by J. Koresh for Carolinas Chapter.**

To Sponsor Conference

Preparations are underway for a 12-paper conference on "Heat Tolerant Metals for Aerodynamic Applications", to be held in Albuquerque, N. Mex., on Jan. 28, 1957. Invitations to participate as speakers have been accepted by a number of highly recognized metallurgists and aerodynamists.

The conference will be jointly sponsored by the Albuquerque and Los Alamos Chapters and the Extension Division of the University of New Mexico.

ASM is the largest publisher of books for the metals industry in the world.

Status of Mechanized Literature Searching Described at Metal Show

The status of the A.S.M.-sponsored investigation on mechanized literature searching was described in one of the technical sessions during the National Metal Congress. The experiment was begun almost a year ago under a contract with the Center for Documentation and Communication Research at Western Reserve University. The pilot plant operation will require three to five years before it can be determined that an operating literature searching service is feasible.

Much progress has been made during the first year of the investigation and this progress was the topic at a meeting of the Metals Division of the Special Libraries Association at Public Auditorium on Thursday morning, Oct. 11. Allen Kent, associate director of the Center for Documentation and Communication Research, was the speaker.

The Documentation Center also occupied a booth at the National Metal Exposition, provided by A.S.M., to demonstrate the mechanical searching methods under development. The demonstration showed how encoded abstracts are searched by means of the experimental searching machine developed at Western Reserve University. Several sample questions were put to the machine. The machine examined automatically punched paper tape and determined which abstracts were pertinent to the given questions. A Flexowriter automatically typed out the serial number of those abstracts which are pertinent.

For the purposes of the experiment at Western Reserve University, 4200 "guinea pig" abstracts have been selected from various well-known sources for processing during the first year of the project. More than 1200 of these have already been converted to "telegraphic style" abstracts and encoded for machine searching. Limited testing of the system will begin within the next few months.

300 Attend Ontario Outing

The **Ontario Chapter** attained a new high over its past record of successful field days when 188 golfers took advantage of excellent weather to compete for the A.S.M. Trophy and valuable prizes at Glendale Golf and Country Club in Hamilton.

Horseshoe pitching and darts were provided for nongolfers. Over 300 members and guests attended the dinner late in the day.

Victor G. Behal, Dominion Foundries and Steel Ltd., was chairman of this 27th Annual Field Day.

Discusses Salt Baths at St. Louis

St. Louis Chapter Speaker E. N. Case (Third From Left) Spoke on "Salt Baths" at a Recent Meeting. Others are, left to right: R. D. Leslie, secretary; H. A. Ball, chairman; Mr. Case; Richard D. Bardes, vice-chairman; and A. H. L. Hunnius, treasurer. (Submitted by C. Swope)

1956-57 Officers of the Carolinas

Officers of the Carolinas Chapter for the New Season Are, Seated, From Left: H. F. Blackwood, Past Chairman; A. B. Cooper, Chairman; and, Standing: J. R. Huntly, Director; J. L. Highsmith, Treasurer; M. R. Thomas, Director; R. J. Polivka, Vice-Chairman; and A. R. Fairchild, Director

New Films

Bright Steel

Bethlehem Steel Co. has announced the release of a new 16mm.-sound motion picture, "Bright Steel", which describes the manufacture of quality tinplate and backplate.

Filmed in color at Sparrows Point, Md., the 29-min. picture details production of versatile tinplate and its use in food canning, bottle capping and other industries. The film won an award at the recent Cleveland Film Festival.

"Bright Steel" is available on free loan to technical and engineering societies and colleges and secondary schools.

Requests, which should be made at least one month in advance of the planned play date, should be sent to Modern Talking Picture Service, Inc., 3 East 54th St., New York 22.

OBITUARY

Arthur J. Boyer, Philadelphia sales representative since 1944 for E. F. Houghton & Co., died late in August after an illness of several months. He was 67 years of age.

A veteran of both world wars, Mr. Boyer held the rank of major. He was formerly a vice-president in the investment firm of Lewis C. Dick Co., Philadelphia, where he attended Franklin and Marshall College and the Philadelphia Textile Institute.

Mr. Boyer was an active member of the Philadelphia Chapter.

Metallurgical News and Developments

Devoted to News in the Metals Field of Special Interest to Students and Others

A Department of *Metals Review*, published by the
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Navy Contract—A $200,000 development contract, awarded to Horizons Inc., Cleveland industrial research organization, by the Navy Bureau of Aeronautics covers the development of a commercial method for producing virgin titanium metal by Horizons' electrolytic process. The new process, which has been in the experimental stage for the past two years, has now been successfully proven by Horizons on a laboratory scale. It is a modification of the original fused salt electrolysis procedure.

Better Wages—Industry has hiked starting salaries for Lehigh University graduates $35 a month over the previous year, according to the director of placement. In an analysis of basic starting salaries for this year's graduates, the average starting salary for engineers was $418, which represents a 9.1% increase over last year's average of $383.

Vacuum Furnace—A vacuum furnace process which produces a metal free of impurities normally found in air-melted ingots has been put into operation at Armour Research Foundation. The furnace will enable metallurgists to delve into the techniques and possible application of vacuum metal castings and give them better control over the environment in which the metal is melted and cast.

Research Reactor — Research into atomic chain-reaction physics, aimed at producing fissionable materials more efficiently, will be speeded by an experimental graphite reactor in operation at the Hanford atomic plant. General Electric, which operates this A.E.C. plant, will use the new $200,000 test unit to evaluate methods of constructing uranium fuel pieces and distributing them within present atomic reactors. The unit is called PCTR, short for Physical Constants Test Reactor.

New Addition—A 20,000 sq.ft. plant addition has been completed by Surface Combustion Corp. Building of the new plant is part of a general expansion and growth program dictated by increased demands for industrial furnace equipment. The building is constructed of reinforced aluminum siding with translucent fiberglass reinforced plastic skylights.

A.I.M.E. Meet—Fifty years of electric furnace steelmaking will be celebrated at the 14th Annual Electric Furnace Steel Conference, sponsored by the Electric Furnace Steel Committee of the American Institute of Mining, Metallurgical, and Petroleum Engineers, to be held Dec. 5-7, 1956, at the Morrison Hotel, Chicago.

Plastics Conference—"Fifteen Years of Plastics Progress" is the theme of the 13th Annual National Technical Conference to be presented by the Society of Plastics Engineers, Inc. This conference, which is being built around the most complete assemblage of technical papers available on the subject of plastics, will be held in St. Louis, Jan. 16 to 18, 1957.

New Corporation—Thermo Materials, Inc., a San Francisco corporation specializing in the development and production of precision high-temperature industrial ceramics, will manufacture and distribute high-temperature ceramic and cermet items for the electronic and fabricated metal industries as well as ferrite components capable of withstanding high-temperature environments to meet the increasing demand in the mechanical, electrical, chemical and nuclear industries.

Enters Researching—Mellon Institute, pioneer scientific research institution, will initiate a major research effort in the field of peaceful atomic energy applications, Matthew B. Ridgeway, chairman of the board of trustees, has announced. The institute has established a new department of radiation research to carry on the work, has employed an outstanding radiation chemist to head the department and purchased a three-million volt Van de Graaff particle accelerator as its initial radiation source.

Charter Granted—A new nonprofit organization, Midwest Job Galvanizers Association, has been established in Chicago, to represent the jobbing hot dip galvanizing industry and to advance the quality of hot dip coatings through vigorous quality control programs. A prerequisite for members is membership in the American Society for Testing Materials, and a guarantee that all galvanizing work be done in compliance with appropriate specifications of that Society.

Rust Protection—Approximately 15% of all steel rolled in the United States is galvanized for rust protection. Estimations of steel products destroyed by rust annually is between three and five billion dollars.

Bessemer Reversed—A steelmaking process which eliminates blast furnaces and the pig iron step is presently under development in Great Britain. The process, called "Cyclo Steel", should be in production within 10 years. The new method utilizes droplets of liquid ore that are suspended in a high-temperature gas and then the metal is separated from the waste by cyclonic whirling.

New Corrector—Sutton Engineering Co. has announced availability of a new contour correcting and straightening machine, which corrects cross-sectional distortions of aluminum extrusions. Designed for simple change-over to different extruded shapes, the machine employs multiple rolls of simple design, providing flexibility to correct cross-sectional distortions that occur in the extrusion and heat treatment of today's complex shapes.

Super Alloy—Westinghouse has unveiled a new alloy, Nivco, designed to have high strength up to 1200° F., combined with ability to resist mechanical vibration. It is reported to have five times the strength of 12% chromium steel and a damping nearly equal to chromium steel at 900° F.

Aluminum Magnet—An electromagnet has been developed that is made from thin sheets of aluminum foil. It is said to be cheaper and lighter than existing types. Development was at the University of Colorado.

Plants Produce—Olin Mathieson Chemical Corp. and Revere Copper and Brass, Inc., have announced the formation of a jointly owned $231-million company, the Olin Revere Metals Corp., to produce 180,000 tons of primary aluminum a year.

National Prizes—National prizes of $1000, $750, $400, $200 and $100 are being offered in each of two classes in the 3rd Product Development Contest of the Steel Founders' Society of America. Class I includes all persons not employed by the steel castings industry, Class II covers its employees. The contest closes midnight, June 1, 1957.

Compliments

To WILLIAM E. MAHN, Cambridge, Ohio, consulting engineer on research and development problems, on being named executive secretary of the Committee on Manpower for the Metallurgy and Ceramics Professions. He will coordinate the work of numerous study groups surveying scholarship plans and secondary school guidance programs. He is currently serving as chairman of a special A.S.M. policy group.

♦ ♦ ♦

To ELMORE H. BROADHURST, who has been named general manager of the Cyclops Division, Universal-Cyclops Steel Corp. A native of Pennsylvania, he has been associated with Universal-Cyclops since 1936. He is a past chairman of the Northwestern Pennsylvania Chapter.

♦ ♦ ♦

To STANISLAUS SKOWRONSKI, who has retired after 44 years with the Anaconda Co. He is a 1904 graduate of Massachusetts Institute of Technology and a past chairman of the New Jersey Chapter. For 25 years he served as adjunct professor of metallurgy at Polytechnic Institute of Brooklyn. He was 75 on July 8.

♦ ♦ ♦

To JOHN HANCOCK CALLENDER, architectural consultant, for being awarded $1000 in the First Annual Allmetal Stainless Steel competition. His winning entry, *The Design of Stainless Steel Curtain Walls,* was based on a report of a two-year impartial study by the School of Architecture of Princeton University. He participated as a research associate. Formal presentation was made at A.S.M.'s Awards Luncheon held during the National Metal Congress and Exposition.

♦ ♦ ♦

To ROBERT F. MEHL, director of the Metals Research Laboratory and head of the department of metallurgical engineering at Carnegie Institute of Technology, who has been awarded the Grand Medal of the Societe Francaise de Metallurgie. Presentation of the award will be made at the Autumn Metallurgical Meetings in Paris, Oct. 22 to 27. Before joining the Carnegie faculty in 1932, Dr. Mehl was a Proctor Fellow in chemistry at Princeton, head of the department of chemistry at Juniata College and a National Research Fellow at Harvard. He holds a B.S. degree from Franklin and Marshall and a Ph.D degree from Princeton, and has received three honorary doctorates. He is an author and editor in his fields, and has lectured both here and abroad. He was the recipient of the John Scott Medal, certificate and prize award for development of gamma-ray radiography, the Henry Marion Howe Medal of the A.S.M. in 1939, and delivered the Priestley Lectures at Pennsylvania State College in 1938. He has been author or co-author of over 80 technical papers and reports.

IMPORTANT MEETINGS *for November*

Oct. 29-Nov. 1—Wire Association: Annual Convention, Penn-Sheraton Hotel, Pittsburgh (Richard E. Brown, Secretary, W. A., Stamford Trust Co. Bldg., 453 Main St., Stamford, Conn.)

Oct. 31-Nov. 1-2—Society for Experimental Stress Analysis: Annual Meeting, Deshler-Hilton Hotel, Columbus, O. (W. M. Murray, Secretary-Treasurer, S.E.S.A., P. O. Box 168, Cambridge 39, Mass.)

Nov. 1-2—Society for Applied Spectroscopy: Annual Meeting, Hotel New Yorker, New York. (C. A. Jedlicka, Secretary, S.F.A.S., 1415 Park Ave., Hoboken, N. J.)

Nov. 1-4—National Tool & Die Manufacturers Association: Annual Meeting, Hotel Statler, Hartford, Conn. (George S. Eaton, Executive Secretary, N.T.&D.M.A. 907 Public Square Building, Cleveland 13)

Nov. 7-10 — Scientific Apparatus Makers Association, Laboratory Apparatus and Optical Sections: Midyear Meeting, The Homestead, Hot Springs, Va. (Jim Irving, Director of Public Information, S.A.M. 20 North Wacker Dr., Room 3120, Chicago, 6)

Nov. 13-15—Investment Casting Institute: Annual Meeting, Sheraton Cadillac Hotel, Detroit (Peter Schipper, Director, I.C.I., 27 East Monroe St., Chicago 3)

Nov. 28-30—National Industrial Conference Board, Inc.: Atomic Energy Conferences, Waldorf-Astoria, N. Y. (Herbert S. Briggs, Secretary, N.I.C.B., 460 Park Ave., New York 22)

Nov. 25-30 — American Society of Mechanical Engineers: Annual Meeting, Hotel Statler, N.Y. (C. E. Davies, Secretary, A.S.M.E., 29 West 39th St., New York 18)

IN RETROSPECT

The 1925 Annual Convention and Exposition was held in Cleveland under the leadership of WILLIAM S. BIDLE, president of W. S. Bidle Co. (now deceased) the national president, and brought the usual superlatively enthusiastic plaudits of the trade press. "The convention and exposition has definitely become one of the leading events in the year's history. . . All past records were easily eclipsed. . . Praise and admiration for the smoothness with which this really large undertaking passed off heard on all sides. . . From the technical standpoint one of the highest in quality in this country. . . Sessions attended by 250 and at one even 500. . . Size and importance attained in the Society's brief seven years existence. . . Exposition the greatest ever held. . ."

♦ ♦ ♦

Two items of interest appear in the secretary's report that year. One is a graph showing the amount of exposition space used at each of the seven shows, growing progressively from 6500 sq. ft. in 1919 to 45,000 in 1925. (The Cleveland Show of 1956 contained some ten times that much space in the same public auditorium —since enlarged—which was new that year). The other item was that convention papers were being preprinted for the first time.

♦ ♦ ♦

Honors presented during the annual meeting were the bestowal of an honorary membership on CHARLES F. BRUSH, Cleveland's eminent scientist and inventor of the arc lamp (since deceased), the Howe Medal to HORACE H. LESTER, research physicist, Watertown Arsenal (now deceased), and a founder membership to ARTHUR G. HENRY of Chicago (now deceased).

♦ ♦ ♦

The newly elected president was ROBERT M. BIRD (now deceased) who had just resigned as engineer of tests for Bethlehem Steel Co. and was associated with GEORGE F. PETTINOS, Philadelphia, in the production and sale of foundry sands.

Worcester Officers Start Year

Officers of the Worcester Chapter for the Coming Season Are, From Left: Edward F. Grady, Assistant Secretary; Herbert D. Berry, Past Chairman: Lincoln G. Shaw, Chairman; Walter J. Nartowt, Vice-Chairman; and Ralph N. S. Merritt, Jr., Secretary-Treasurer. (Photograph by C. W. Russell)

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Akron	Nov. 14	Sanginiti's	D. S. Clark	National Officers Night
Baltimore	Nov. 19	Engineers Club	N. L. Mochel	Modern Gas Turbine Design
Boston	Nov. 2	Museum of Science	C. Hinton	Aluminum
Buffalo	Nov. 8	Mann's 300 Club	W. A. Black	Nondestructive Tests for Discontinuities
Carolinas	Nov. 15	Charlotte	C. J. Oxford, Jr.	Modern Drills and Drilling Techniques
Chattanooga	Nov. 20	Maypole Restaurant	C. K. Donoho	European Metallurgy Techniques
Chicago	Nov. 12	Furniture Club	P. C. Rossen	Radical Developments in Metallurgy
Chicago-Western	Nov. 19	Spinning Wheel	O. Cullen	Modern Quenching Techniques
Cincinnati	Nov. 8	Engineering Society	W. T. Bean, Jr.	Nondestructive Testing
Columbia Basin	Nov.		L. K. Keay, Jr.	Application of Clad Steel
Columbus	Nov. 7	Broad St. Christian Church	Howard Scott	Metallurgical Aspects of High-Frequency Heating
Dayton	Nov. 14		Russell Novy	Prepared Atmospheres in Heat Treating and Brazing
Detroit	Nov. 12	Horace Rackham Memorial	H. B. Osborn, Jr.	Effects of Induction Heating on Properties of Steel Parts
Indianapolis	Nov. 12	Brody's Village	D. S. Clark	Dynamic Properties of Metals
Kansas City	Nov. 21	American Legion Memorial Hall	Panel	Metallurgical Process Operation
Lehigh Valley	Nov. 9	Hotel Traylor	D. S. Clark	What Do Dynamic Lab Tests of Metal Tell Us?
Los Angeles	Nov. 15	Rodger Young Auditorium	J. J. Waisman	Effect of Residual Stresses on the Behavior of Aircraft Metals
Louisville	Nov.	Appliance Park	E. E. Bryant	Porcelain Enamel as a Corrosion Resistant Material
Mahoning Valley	Nov. 13		E. S. Roland	Practical Applications of Physical Metallurgy
Montreal	Nov. 5		D. S. Clark	National Officers Night
Muncie	Nov. 13	Ball State College Student Center	D. S. Clark	Propagation of Plastic Strain in Metals
New Haven	Nov. 15	New Haven	Plant Visit	Griest Manufacturing Co.
New Jersey	Nov. 19	Essex House	J. H. Redfern, Jr.	Fatigue Studies
New Orleans	Nov. 14	Lenfant's Seafood Restaurant	F. Mohr	Basic Metallurgy of Aluminum
New York	Nov. 5	Hotel Victoria	D. H. W. Allan	Quality Control
Northeastern Pennsylvania	Nov. 8	Irem Temple Country Club	D. G. Foulke	Electroplating of Metals
Northwest Pennsylvania	Nov. 15	Meadville	F. G. Tatnall	Fatigue and Life Testing
Ontario	Nov. 7	Royal Connaught, Hamilton		Die Casting
Oregon	Nov. 9	Washington Hotel	L. K. Keay, Jr.	Clad Steels
Ottawa Valley	Nov. 6	Red Door Tavern	D. S. Clark	Dynamic Properties of Metals
Penn State	Nov. 13	Mineral Sciences Auditorium	Max Gensamer	Astounding Ignorance of Engineers
Philadelphia	Nov. 23	Engineers Club	G. M. Young	Aluminum Alloy Development Up to Date
Philadelphia Junior Section	Nov. 9	Foote Mineral Co., Inc.		Process Metallurgy of Reactive Metals
Pittsburgh	Nov. 8	Gateway Plaza	D. S. Clark	Dynamic Properties of Metals
Purdue	Nov. 20	Memorial Union	J. H. Moore	Vacuum Melting
Rochester	Nov. 12	Howard Johnson's	P. F. Rehner	Advancement in Carbide Materials
Rockford	Nov. 28	Rockford	Plant Visit	Atwood Vacuum Machine Co.
Rocky Mt.-Denver	Nov. 16	Oxford Hotel	R. Richardson	Cermets—Ceramics and Metals
Rome	Nov. 19	Elk's Club	R. A. Schatzel	Materials in the Insulated Wire and Cable Industry
St. Louis	Nov. 16	Hotel Congress	J. A. Fellows	Atomic Power and Reactor Metallurgy
Savannah River	Nov. 8	Tinnerman's Lodge	T. P. May	Corrosion of Stainless Steel and Nickel Alloys
Springfield	Nov. 19	Blake's Restaurant	R. H. Harrington	Nonferrous Metallurgy
Texas	Nov. 6	Ben Milam Hotel	B. R. Queneau	Hardenability
Tri-City	Nov. 13	Rock Island Arsenal	W. C. Truckenmiller	Malleable Irons
Utah	Nov. 14		F. J. Robbins	Machinability
Washington	Nov. 12	American Legion Club	J. F. Victory	Problems of High-Speed Flight
West Michigan	Nov. 19	Lock's Restaurant	A. Schames	Structural Material for Jets
Worcester	Nov. 14	Hickory House	Glenn Boyer	Machining of Leaded and Pre Heat Treated Steel
York	Nov. 14	Steelton	K. Fetters	Steelmaking

A.S.M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared by the Technical Information Division of Battelle Memorial Institute, Columbus, Ohio

A General Metallurgical

267-A. Some Achievements of Modern Metallurgy. Howard K. Worner. *Australasian Engineer,* v. 48, June 1956, p. 58-63.

Significant achievements include production of tremendous tonnages, new production techniques, new industrial metals, improved properties in "old" metals, and advances in melting, casting, heat treatment, fabrication, finishing and testing. (A general)

268-A. Inland Steel's Program of Expansion to Increase Capacity by 1959 to 6,000,000 Tons. Charles Longenecker. *Blast Furnace and Steel Plant,* v. 44, Aug. 1956, p. 884-927, 930 + 4 plates.

Survey of plant's complete operations. (A5, ST)

269-A. The History of Magnesium. C. J. P. Ball. *Institute of Metals, Journal,* v. 84, July 1956, p. 399-411 + 2 plates.

Historical survey of progress of magnesium from its discovery. Production processes used in various countries, types of alloys. (A2, C general, Mg)

270-A. Thirteenth Century Smelting Residues From Kirkstall Abbey. R. Haynes. *Iron and Steel Institute, Journal,* v. 183, Aug. 1956, p. 359-361.

Residues from the smelting of bronze, iron and lead are described. (A2, Cu, Fe, Pb)

271-A. Review of the Metal-Cutting Analyses of the Past Hundred Years. I. Finnie. *Mechanical Engineering,* v. 78, Aug. 1956, p. 715-721.

Historical survey includes 71 references. A basic relationship between the various variables in metal cutting is still lacking. (A2, G17)

272-A. What Can Production-Function Analysis Do for the Metallurgical Industry. Norman R. Gardner, Jack D. Wolf and Amos J. Shaler. *Microtecnic (English Ed.),* v. 10, no. 2, 1956, p. 65-70.

Examples of production functions. Development of a production function for the blast furnace. (A4, A5, D1)

273-A. The Treatment of Metal Plating Wastes at Sperry's Gainesville, Florida Plant. Fred A. Eidsness and Paul B. Bergman. *Plating,* v. 43, Aug. 1956, p. 1005-1007.

Design and operation of demineralization and waste treatment plant. (A8, L17)

274-A. Planning Can Reduce Waste Treatment Costs. F. L. Neff. *Plating,* v. 43, Aug. 1956, p. 1008-1011.

Factors affecting choice of a treatment scheme in applying the alkaline chlorination method. (A8, L17)

275-A. Profitable Recovery of Plating Wastes by Reconcentration of Reduced Volume Rinses. K. Odland and J. C. Hesler. *Plating,* v. 43, Aug. 1956, p. 1022-1025.

Reduced rinse flows resulting from efficient countercurrent rinsing practice now make feasible the application of evaporation equipment for complete recovery of drag-out losses, thereby eliminating destruction costs, and reclaiming valuable metals. Applications to recovery of metallic cyanides and chromic acid illustrated. (A8, L17, Cr)

276-A. Semi-Annual Summary Research Report in Metallurgy. *Ames Laboratory (U. S.. Atomic Energy Commission),* ISC-708, May 1956, 37 p.

Purification, separation and metal preparation studies, preparation of pure compounds, alloy systems, metal coatings and corrosion, solid state investigations, rare earth metallurgy. (A general)

277-A. Guide to Alkali Metals Handling. W. W. Kendall, L. H. B. Peer, W. J. Scheiber and F. C. Steiner. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* AECU-3143, July 1954, 32 p.

Personal safety equipment, fire prevention and fire fighting, emergency panels, storage of liquid metals, disposal and cleaning, handling of radioactive metals. (A7, EG-e)

278-A. Titanium Plant at Boulder City, Nev.: Operating Costs. C. T. Baroch and T. B. Kaczmarek. *U. S. Bureau of Mines, Report of Investigations* 5248, July 1956, 21 p.

Summary of cost data for 15 months includes raw materials, labor and supervision, supplies, utilities, direct overhead depreciation of building and equipment, administrative overhead and capital costs. (A4, C4, Ti)

279-A. Cyanide and Chromium Recovery From Plating Wastes. Louis Weisberg and E. J. Quinlan. *Sewage and Industrial Wastes,* v. 28, Aug. 1956, p. 998-1008.

Waste treatment to recover most of the so-called waste materials in useful form instead of destroying them. (A8, L17, Cr)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

280-A. (German.) The Importance of the Rare Metals in Modern Techniques. Willy Schreiter. *Neue Hütte,* v. 1, no. 7, July 1956, p. 381-389.

The influence of small amounts of rare-metal alloying elements upon the properties of metals and alloys; applications in atomic energy. (A general, B22, EG-b)

281-A. (German.) Contribution to the Previous and Early History of the Bessemer Process. Herbert Dickmann. *Stahl und Eisen,* v. 76, no. 16, Aug. 9, 1956, p. 1020-1024.

The "Schleidener Tal" process and the refining process of W. A. Lampadius, the forerunner of Bessemer, is described. (A2, D3, ST)

282-A. A Dictionary of Metallurgy. St-Ta. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 23, Aug. 1956, p. 315-322.

From "Straits Tin" to "Taurus Bronze". (To be continued.) (A10, Sn, Cu)

283-A. The Foundry's Attack on Air Pollution. *Modern Castings,* v. 30, Sept. 1956, p. 33-48.

General picture of the air pollution problem includes legislation, community relations, sources, sampling and analysis and control equipment. (A8, E general)

284-A. (Book.) Year Book of the American Bureau of Metal Statistics for 1955. v. XXXV. 127 p. 1956. American Bureau of Metal Statistics, 50 Broadway, New York, N. Y. $3.00.

Tabulated data on copper, lead, zinc, gold, silver, aluminum, and other miscellaneous metals. (A4, EG-a)

B Raw Materials and Ore Preparation

218-B. Ore-Dressing Research in India. *Chemical & Process Engineering,* v. 37, July 1956, p. 228-229.

Research during 1955 was highlighted by a study of the role of depressants in sulfide and silicate flotation, beneficiation of graphite, phosphate rock and chromite by tabling and flotation, upgrading of vermiculite by heavy media separation and tabling, and the differential flotation of beach minerals. (B14)

219-B. Extraction Process for South African Gold-Uranium Ores. A. M. Gaudin, R. Schuhmann, Jr., and J. Dasher. *Mining Engineering,* v. 8, Aug. 1956, p. 802-806.

A complete process for gold and

uranium recovery is divided into 16 steps, 6 for gold, 6 for uranium, and 4 to recover the leach acid. (B14, Au, U)

220-B. Oxidized Copper. II. Who Holds the U. S. Deposits? James W. Franklin. *Engineering and Mining Journal*, v. 157, Aug. 1956, p. 80-85.

Survey of U. S. reserves, stating grade and tonnage. (B10, Cu)

221-B. Yugoslavia Seeks Mineral Development. Rikard Marusic and Viktor Kersnic. *Engineering and Mining Journal*, v. 157, Aug. 1956, p. 86-90.

Mineral reserves and production of principal ores in Yougoslavia. (B10)

222-B. Mineral Shortages and Foam Flotation. N. Pilpel. *Research*, v. 9, Aug. 1956, p. 282-288.

Fundamental principles of the process and recent developments in the technique. (B14)

223-B. Development of an Ion Exchange Process for the Recovery of Vanadium. D. C. McLean, E. T. Hollis and R. A. Eisenhauer. *American Cyanamid Company Raw Materials Development Laboratory (U. S. Atomic Energy Commission)*, ACCO-63, July 1954, 68 p.

Theory, chemistry and characteristics of a practical recovery process using either columns or resin-in-pulp. (B14, V)

224-B. Proposed Flow Sheet for Recovery of Uranium and Vanadium From Templet Mountain Ore. H. P. Ehrlinger, III, and R. W. Stephens. *University of Nevada (U. S. Atomic Energy Commission)*, AECD-3725, Dec. 1953, 17 p.

The ore is floated to produce concentrates and tailings for separate treatment by leaching. The tailings can be readily treated at the mine by pugging with sulphuric acid and leaching to extract 90% of the uranium in this fraction. (B14, U, V)

225-B. (German.) **Determination of the Optimum Moisture Content and Amount of Fuel in Fine Ore Mixtures for Sintering.** Hans Kosmider, Ewald Bertram and Hermann Schenck. *Stahl und Eisen*, v. 76, no. 14, July 12, 1956, p. 858-870.

Methods for controlling the sintering. Determination of air transmission. Effect of additions of chalk and dolomite. Effect of grain size on sinterability. (B16, Fe)

226-B. (German.) **Possibilities of Capacity Increase in Sinter Installations.** Bernhard Weilandt and Walter Storsberg. *Stahl und Eisen*, v. 76, no. 14, July 12, 1956, p. 870-878.

Factors influencing sintering capacity, fine-ore processing for sintering, experiments with granulation, effect of additions and pretreatment. (B16, Fe)

227-B. (Russian.) **Complex Utilization of the Vanadium, Titanium and Iron of Titanomagnetites in Communist China.** I. F. Krasnykh. *Stal'*, v. 16, no. 6, June 1956, p. 523-530.

Production of ferroalloys from titanomagnetites by concentration of ore and division into two concentrates, followed by metallurgical methods of processing the ferrovanadic concentrate, and then melting out the ferrovanadium and ferrotitanium. (B14, B22, Fe-n)

228-B. Uranium Metallurgy. A. H. Ross. *Canadian Mining and Metallurgical Bulletin*, v. 49, no. 532, Aug. 1956, p. 570-576.

Principles and new developments, uranium minerals, extraction methods, resin in pulp and pulp in solvent processes, preconcentration methods, Canadian practice and costs. (B14, U)

229-B. The Procurement of Some Hitherto Rare Metals. A. R. Powell. *Chemistry & Industry*, no. 31, Aug. 11, 1956, p. 809-812.

Principal sources of the rarer metals, preliminary treatment of raw materials containing them. (B general, EG-b)

230-B. Application of Steam-Fuel Ratio Control to Open Hearth Operations. W. H. Kahl. *Iron and Steel Engineer*, v. 33, Aug. 1956, p. 72-75; disc., p. 75-77.

Steam-fuel ratio equipment gives more uniform operation, precise control and improved protection. Disadvantages are higher initial cost, additional required accessory equipment, and the more highly skilled personnel required. (B18, D2)

231-B. South Africa: Extraction Process for Gold-Uranium Ores. A. M. Gaudin, R. Schuhmann, Jr., and J. Dasher. *Journal of Metals*, v. 8, sec. 1, Aug. 1956, p. 1065-1069.

Development of uranium dissolving step, separation of residue from concentrated liquor, extraction of uranium from concentrated liquor. (B14, Au, U)

232-B. Refractories for Aluminum and Copper Production. W. F. Rochow and C. A. Brashares. *Journal of Metals*, v. 8, sec. 1, Aug. 1956, p. 1070-1073.

The choice of refractories for most furnace equipment used in aluminum production, while largely standardized, is, nevertheless, the subject of continuing research and service trials for selection of those refractories which will provide the best service. (B19, C21, Al, Cu)

233-B. Flocculation of Mineral Suspensions With Coprecipitated Polyelectrolytes. Milton E. Wadsworth and Ivan B. Cutler. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 1, Aug. 1956, p. 1092-1095.

Coprecipitation of anionic and cationic poly-electrolytes was applied to flocculation of several mineral systems. Results obtained in a study of the flocculation of kaolinite and hematite suspensions of polycationic and polyanionic electrolytes are presented. (B14)

234-B. Kinetics of the Oxidation of Galena in Ammonium Acetate Solutions Under Oxygen Pressure. D. P. Seraphim and C. S. Samis. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 1, Aug. 1956, p. 1096-1099.

Experimental materials, equipment and procedure. (B14, R2, Pb)

235-B. Equilibrium Considerations in the Roasting of Metallic Sulfides. Herbert H. Kellogg. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 1, Aug. 1956, p. 1105-1111.

A method of calculation which combines the equilibrium and stoichiometric factors is outlined and illustrated by an example from the roasting of Cu-Fe sulfides. (B15, Cu, Fe)

236-B. Froth Flotation: A Half-Century Review. P. F. Whelan. *Industrial Chemist*, v. 32, Aug. 1956, p. 315-318.

Early history and principles underlying flotation. Reclamation of metallic substances. (To be continued.) (B14)

237-B. Metallurgical Practice on the Kolar Gold Field. F. N. Cholmeley. *Mine & Quarry Engineering*, v. 22, Sept. 1956, p. 366-371.

Covers concentration techniques by flow sheets and photographs. (B14, Au)

238-B. (Czech.) **On the Problem of Producing Self-Fluxing Sinter.** Josef Duda. *Hutnické Listy*, v. 11, no. 8, Aug. 1956, p. 461-467.

Experiments made with an agglomerated mixture of Krivoj Rog ore, blast furnace flue dust and calcined pyrites. (B16, Fe)

239-B. (French.) **Two Years of Practice in the Washing of 1/10 Fines With Thick Liquor.** H. Baudoux. *Annales des Mines de Belgique*, Special No., June 1956, p. 24-28, disc., 28-30.

Use of a Humboldt washer for magnetite treatment. Tables of results from September 1954 to February 1956. (B14, Fe)

240-B. (German.) **The "Three Products" Heavy Media Separation of Siderite at "Alte Hütte".** W. Borek and F. W. Mayer. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 9, no. 8, Aug. 1956, p. 363-367.

Construction and operation of a "Heberad" separator for concentrating siderite with a density of 3.55 and a 6 mm. grading. (B14, Fe)

241-B. (Hungarian.) **Utilization of Aluminum Scrap in Accelerating the Settling of Red-Mud.** Kohaszati Lapok, v. 11, no. 7, July 1956, p. 324-326.

Hungarian experiments for comparing the settling action of flour and aluminum additions. (B14, A8, Al, Fe)

242-B. (Italian.) **The Ion Exchange Resins and Their Use in the Metallurgy of Uranium.** R. De Leone. *Energia Nucleare*, v. 3, no. 3, June 1956, p. 168-175.

Characteristics of the resins, methods and apparatus used in the production of crude salts of uranium. (B14, U)

243-B. (Italian.) **The Extraction of Uranyl Nitrate With Organic Solvents. I. Methyl-Isobutyl-Ketone.** A. Cacciari, R. De Leone, C. Fizzotti and M. Gabaglio. *Energia Nucleare*, v. 3, no. 3, June 1956, p. 176-181.

Influence of the presence of nitric acid. Extraction of ferric nitrate by the same method in the presence of sulfates, phosphates and chlorides. (B14, U)

244-B. (Book.) **An Introduction to Mineral Dressing.** E. J. Pryor. 649 p. 1955. Mining Publications, Ltd., Salisbury House, London, E.C. 2, England. $9.80.

Basic principles underlying sound milling practice; their relation to standard commercial concentrating operations. (B13, B14)

245-B. (Book-German.) **Introduction to Metallurgy.** Rudolf Vogel. 169 p. 1955. Musterschmidt-Verlag, Gottingen, Germany.

Metal deposits and their exploitation; pyrites; metallic oxides. High-temperature reactions of nonmetallic elements in metals. Electrolytic separation; refining; furnaces. Metallurgy of various metals, nonferrous and ferrous. (B general, C general, D general)

246-B. (Book-Italian.) **The Study Center for Ore Dressing.** Luigi Usoni. 27 p. + 21 plates. 1956. Consiglio Nazionale Delle Ricerche, Rome, Italy.

Flotation, concentration, and processing of poor ores. Pilot-plant investigations. (B14)

C

Nonferrous Extraction and Refining

250-C. Chemical Treatment of Molten Metals. D. V. Atterton. *Australasian Engineer*, v. 48, June 1956, p. 64-72.

Modern chemical methods of treat-

ing molten light and copper-base alloys for fluxing, gas removal and grain refinement. Physical and chemical theories underlying such treatments. (C5, E25, Mg, Cu, Al)

251-C. Principles and Limits of Vacuum Melting. W. Deisinger. *Henry Brutcher, Translation No.* 3754, 10 p. (Abridged from *Berg-und Hüttenmännische Monatshefte,* v. 100, no. 7-8, 1955, p. 214-218.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 183-C, 1955. (C25, C21)

252-C. High Vacuum Arc Melting of Refractory Metals. F. Benesovsky, K. Sedlatschek and W. Wirth. *Henry Brutcher, Translation No.* 3687, 9 p. (Abridged from *Berg-und Hüttenmännische Monatshefte,* v. 100, no. 7-8, 1955, p. 219-224.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 184-C, 1955. (C25, Mo, Cb, Ti, W, Zr)

253-C. The Reduction of Ore to Metal. L. M. Pidgeon. *Metal Progress,* v. 70, Aug. 1956, p. 81-85.

Four widely used methods discussed with their limitations and advantages. (To be continued.) (C general)

254-C. Application of Liquid-Liquid Extraction for the Separation of Zirconium From Hafnium. R. A. Foos and H. A. Wilhelm. *Iowa State College (U. S. Atomic Energy Commission),* ISC-693, July 1954, 38 p.

Many single and multistage extractions employing immiscible organic solvents were carried out on aqueous solutions of the compounds to be separated. Analyses of the equilibrium phases allowed calculation of individual distribution coefficients and their separation factors. (C general, Zr, Hf)

255-C. Application of Liquid-Liquid Extraction to the Separation of Tantalum From Niobium. Raymond A. Foos and H. A. Wilhelm. *Iowa State College (U. S. Atomic Energy Commission),* ISC-694, July 1954, 71 p.

Tantalum and columbium spectrographically free of each other were prepared in quantity on a continuous basis, using many organic solvents. The most effective separation was obtained when the free hydrofluoric acid content was low. (C28, Ta, Cb)

256-C. Complex Metallurgy by Cerro de Pasco. I. L. Barker. *Journal of Metals,* v. 8, sec. 1, Aug. 1956, p. 1058-1064.

Operations of the Cerro de Pasco Corp. in Peru, summary of recent developments. (G21, C23, Cu)

257-C. Melting and Fabricating Binary Uranium Alloys. F. R. Lorenz, W. B. Haynes, and E. S. Foster. *Journal of Metals,* v. 8, sec. 1, Aug. 1956, p. 1076-1080.

Vacuum induction melting and consumable electrode arc melting were combined into a duplex melting technique enabling the production of sound, homogeneous ingots up to 4-in. diam, weighing approximately 50 lb. (C5, U)

258-C. Recent Developments in Electrolytic Copper Refining. Stuart S. Forbes. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Aug. 1956, p. 1081-1086.

Changes and additions made to the Canadian Copper Refiners Ltd. electrolytic refinery between 1949 and 1955. Effect of high current density on current efficiency and section work. (C23, Cu)

259-C. Silicothermic Reduction of Magnesia and Ferrosilicon Activities. Bernt Ellingsaeter and Terkel Rosenqvist. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 1, Aug. 1956, p. 1111-1112.

Briquettes of burned dolomite and Fe-Si alloys were placed in a 1-in. heat resistant steel tube and heated to 1200 C. By means of a flow of purified hydrogen, the magnesium vapor was swept into a condenser filled with steel wool. From the amounts of hydrogen used and magnesium condensed the magnesium partial pressure was calculated. (C26, Mg, Fe, Si)

260-C. Helium and Argon as Inert Atmospheres in Producing Titanium. C. T. Baroch, T. B. Kaczmarek and J. F. Lenc. *U. S. Bureau of Mines, Report of Investigations 5253,* July 1956, 17 p.

High-purity argon can be substituted for helium in reduction of titanium-tetrachloride with magnesium. (C4, Ti)

261-C. (French.) **Research on the Preparation of Germanium by Igneous Electrolysis.** *Journal du Four Electrique,* v. 65, no. 4, July-Aug. 1956, p. 131-132.

The preparation of germanium and of its binary alloys by electrolysis of baths of melted germanate or of germanium oxide dissolved in metal salts. (C23, Ge)

262-C. (French.) **Purification of Titanium by the Iodide Process.** R. Lignon. *Revue de Métallurgie,* v. 53, no. 7, July 1956, p. 503-509; disc., p. 509.

Kinetics of titanium iodide formation through direct action of iodine vapor upon titanium. Characteristic curves of the reaction. (C4, Ti)

263-C. (German.) **Smelting and Casting of Titanium and Titanium Alloys.** Hans-Walter Schleicher. *Giesserei,* v. 43 no. 17, Aug. 16, 1956, p. 445-450.

Smelting, chill casting and continuous casting of titanium and its alloys. Studies of properties, special smelting conditions, types of furnaces, gas atmosphere and additions. (C21, C5, Ti)

264-C. (German.) **Potassium Titanium Fluoride Electrolysis in Smelted Mixtures With Potassium Chloride-Sodium Chloride.** P. Drossbach and E. Rossberger. *Zeitschrift für Elektrochemie,* v. 60, no. 5, May 1956, p. 470-473.

Measurements of polarization tension and single potentials. Formation of three-valency titanium complex with 97.5 to 99.7% metal content. (C23, Ti)

265-C. (Czech.) **Raising of Electrical Conductivity of Commercial Aluminum.** Rudolf Pelzl. *Hutnické Listy,* v. 11, no. 8, Aug. 1956, p. 477-480.

Uses a flux mixture of borax, cryolite and common salt. (C23, P15, Al)

266-C. (German.) **Extracting and Refining Metals by the Mercury Extraction Method.** Heinz Borchers. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 9, no. 8, Aug. 1956, p. 383-387, disc., 387-388.

Mercury as a solvent for precious metals. Its use in extracting aluminum from crude alloys and in refining scrap metals. (C29, A8, EG-c, Al)

267-C. (Italian.) **The Metallurgy of Uranium and Thorium. II. Production of Metallic Uranium.** A. Cacciari, R. De Leone, C. Fizzotti and M. Gabaglio. *Energia Nucleare,* v. 3, no. 3, June 1956, p. 154-167.

Production methods in France, Italy, Sweden and Belgium. (C general, U, Th)

D

Ferrous Reduction and Refining

308-D. Reduction of Oxides of Iron by Gases. B. V. Kondakov and Z. F. Chukhanov. *Henry Brutcher, Translation No.* 3768, 6 p. (From *Doklady Akademii Nauk SSSR,* v. 106, no. 4, 1956, p. 697-700.) Henry Brutcher, Altadena, Calif.

Rate constants for the reduction of ferrous oxide, from extremely simple experiments. (D8, Fe)

309-D. Burning-In of a New Bottom in a Large All-Basic Open-Hearth Furnace. V. O. Kulikov and I. I. Bornatskii. *Henry Brutcher, Translation No.* 3531, 11 p. (From *Stal',* v. 15, no. 7, 1955, p. 597-600.) Henry Brutcher, Altadena, Calif.

Practice, developed at a Russian steel plant, for new bottoms in 410-net ton all-basic openhearth furnaces. Materials used for the burning-in of bottom and banks; duration of sintering. (D2, B19, ST)

310-D. Influence of Conditions of Crystallization Upon Tearing of Steel Ingots. V. A. Efimov, V. I. Danilin and M. P. Lapshova. *Henry Brutcher, Translation No.* 3644, 15 p. (From *Stal',* v. 15, no. 7, 1955, p. 601-606.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 330-D, 1955. (D9, ST)

311-D. (German.) **Converter Bottom With Jets in Thomas Steel Works at Hayingen.** Raymond Remy. *Stahl und Eisen,* v. 76, no. 14, July 12, 1956, p. 879-881.

Magnesite bottom increases productivity. Effect of round-the-clock operation. (D3, B19, ST)

312-D. (Russian.) **Effect of Heating the Blast on the Operation of a Blast Furnace.** I. G. Voichenko. *Stal',* v. 16, no. 6, June 1956, p. 483-486.

Also studied were the effects of the size and shape of the oxidizing zone, the blast temperature, ore-charge size and other parameters. (D1, CI)

313-D. (Russian.) **Effect of Elevated Pressure of Gas on the Chemical Composition of Pig Iron.** V. L. Pokryshkin. *Stal',* v. 16, no. 6, June 1956, p. 487-492.

Adapting blast furnaces to use of elevated pressures decreases the degree of reduction of silicon and manganese and improves carbonization of the metal. Decrease in coke expenditure and a more even furnace operation account for a decrease in sulfur content. (D1, CI)

314-D. (Russian.) **Use of Oxygen in the Openhearth Scrap-Ore Process.** I. P. Bardin, K. G. Trubin, L. M. Efimov, K. M. Trubetskov, V. N. Kornfel'd, R. I. Men'shikov and V. F. Mazov. *Stal',* v. 16, no. 6, June 1956, p. 493-505.

Relation between concentration of oxygen in the blast and melting time. Variations in methods and their effects on furnace operation and quality of the steel. (D2, ST)

315-D. (Russian.) **The Development and Practice of the Process of Continuous Casting of Steel.** M. S. Boichenko, V. S. Rutes and N. A. Nikolaev. *Stal',* v. 16, no. 6, June 1956, p. 505-513.

Carefully elaborated techniques of continuous casting are being success-

fully adapted in various steelmaking plants with increased economy of operation and higher quality of steel semiproducts, particularly sheet steel, made from the cast slabs. (D9, ST)

316-D. (Russian.) **Vacuum Melting of Transformer Steel.** G. A. Garnyk and A. M. Samarin. *Stal'*, v. 16, no. 6, June 1956, p. 514-518.

Laboratory and semiproduction-scale tests show great improvement of magnetic properties of transformer steel when melted in a vacuum furnace and when content of nonmetallic inclusions and gases is kept low. Silicon content may be increased without creating troubles in cold rolling. (D8, P16, SG-p)

317-D. (Russian.) **Nonmetallic Inclusions in Ball-Bearing Steel.** S. I. Sapiro, *Stal'*, v. 16, no. 6, June 1956, p. 519-523.

Emulsifying action of carbon in slags. Oxidation of carbon in the slag before steel is tapped from electric-arc furnace, in order to minimize formation of nonmetallic inclusions. (D5, M27, N14, ST)

318-D. The Oxygen Steelmaking Process. I. D. O. Davis. *Industrial Heating*, v. 23, Aug. 1956, p. 1641 + 8 p.

Oxygen steelmaking at a Canadian plant, economics of such a system. (To be continued.) (D8, ST)

319-D. (Czech.) **The Burning of Coke in the Tuyere Region of Blast Furnaces.** Jindrich Sarek. *Hutnik*, v. 6, no. 6, June 1956, p. 167-168.

A study of the processes taking place in the combustion areas near the tuyeres when the coke burns. The mechanism of coke movement and the gas formation in this area. D1, B18, Fe)

320-D. (Czech.) **The Use of Oxygen in Martin Furnaces.** Edward Bernard. *Hutnik*, v. 6, no. 6, June 1956, p. 168-171.

Theoretical reasons for adding oxygen, calculations for the optimum amount to be used, shortening the melting time, practical methods for introducing oxygen. (D2)

321-D. (French.) **Sulfur Pickup in Openhearth Fired With Fuel Oils.** B. Trentini, A. Peters and G. Husson. *Revue de Métallurgie*, v. 53, no. 7, July 1956, p. 529-553.

The relationship between sulfur content of fuel oil and steel shows that an increase of 1% in sulfur in the fuel leads to an increase of 0.007% in the steel. (D2, ST)

322-D. (French.) **Refractories in Blast Furnaces.** Louise Halm. *SIM—Documentation Métallurgique*, no. 26, Apr., May, and June 1956, p. 189-200.

Working conditions of blast furnaces in relation to their various parts. Qualities required in refractories. (D1, B19)

323-D. (German.) **Fine Dephosphorization in the Thomas Converter.** Heinrich Rellermeyer and Theo Kootz. *Stahl und Eisen*, v. 76, no. 15, July 26, 1956, p. 965-968.

Activity of ferrous oxide and potassium oxide in the system FeO-CaO-P_2O_5. Effect of slag basicity on oxygen and phosphorous content in steel, temperature effects. (D2, ST)

324-D. (German.) **Investigation of the Characteristics of a Mixer for Basic Bessemer Pig-Iron.** Erwin Eickworth, Hermann-Josef Kopineck and Gustav Opfer. *Stahl und Eisen*, v. 76, no. 16, Aug. 9, 1956, p. 1028-1032.

Discusses mixing efficiency, describes a large-scale test with radioactive phosphorous-32. (D3, CI, ST)

325-D. (German.) **Spectrographic Examination of the Converter Flame During the Course of the Basic Bessemer Process.** Frank Wever, Walter Koch, Horst Hofermann, Helmut Knüppel, Karl Ernst Mayer and Gert Wiethoff. *Stahl und Eisen*, v.. 76, no. 16, Aug. 9, 1956, p. 1032-1040.

Apparatus, observation stations, mode of proceeding and results of the spectro-chemical examinations. The spectrum of the decarburization and dephosphorization period.

326-D. (Russian.) **Blowing Oxygen Into the Bath in Martin Furnaces When Refining Phosphorous Cast Iron.** Ia. A. Shneerov, G. N. Oike, V. V. Leporskii, V. G. Sladkoshteev, A. I. Sukachev and P. N. Slepkanev. *Stal'*, v. 16, no. 7, June 1956, p. 587-596.

Means of blowing oxygen through the bath of a 350-ton Martin furnace. Oxygen is introduced through rear wall after filling with cast iron. Quality of the metal is same as that obtained by the usual method. (D2, ST)

327-D. (Russian.) **Operating Martin Furnaces With Auxiliary Air Feed Through the Gas Opening.** S. N. Bystrov, A. A. Dobrokhotov and A. M. Morozov. *Stal'*, v. 16, no. 7, June 1956, p. 597-601.

Introducing an auxiliary supply of air through the gas opening increased output by 5 to 7% and reduced the amount of fuel used. (D2, ST)

328-D. (Russian.) **Preventing Axial Cracks in Alloy Steel Ingots.** Ia. M. Bokshitskii, M. A. Pertsev and F. V. Kozlov. *Stal'*, v. 16, no. 7, June 1956, p. 602-608.

Causes of axial cracks in chormium-nickel-tungsten steel ingots. Preventing these defects by slowing down the rate of cooling in the mold or by casting semimolten metal in heated molds. (D9, AY)

329-D. Steel Production Today. R. L. Knight. *Australasian Engineer*, v. 48, July 1956, p. 48-55.

Compares Bessemer, openhearth and electric arc steelmaking methods with new L. D. converter process. (D general, ST)

330-D. (Russian.) **Using Natural Gas in the Openhearth Furnace.** V. I. Palant and B. N. Kurochkin, *Metallurg*, no. 7, July 1956, p. 14-17.

Changes required for using natural gas to produce low-sulphur steel. Gas produces more heat and is cheaper than fuel oil. Operating conditions compared to heating with fuel oil. (D2, CN)

331-D. (Russian.) **Using Compressed Air to Intensify the Flame in the Openhearth Furnace.** M. G. Kozhanov and G. B. Rogov. *Metallurg*, no. 7, July 1956, p. 18-19.

Using compressed air (at 3.5 to 4.5 atmospheres) to improve combustion increased the heat 30 to 40° C. Compressed air is injected through the burners. (D2, ST)

E
Foundry

458-E. Fundamental Considerations for Cupola Operation. W. R. Jaeschke. *Foundry Trade Journal*, v. 101, July 12, 1956, p. 39-45.

An early study of combustion in a cupola. Factors of cupola operation that affect the combustion and melting conditions. Emphasizes importance of coke quality, material size, stock distribution and "hang-ups." (E10, CI)

459-E. Shrinkage Defects in Grey-Iron Castings. I. C. H. Hughes and J. H. Gittus. *Foundry Trade Journal*, v. 101, July 19, 1956, p. 71-83.

Effects of pouring temperature, metal composition, mode of solidification and casting design upon shrinkage defects in gray iron castings. (E25, CI)

460-E. Cupola Experiments. K. G. Harris. *Foundry Trade Journal*, v. 101, July 1956, p. 101-110.

Investigation of such variables as combustion conditions, optimum charge-weights, charge distribution and lining erosion has enabled a controlled method of cupola operation to be evolved. (E10)

461-E. Fundamentals of Shell Moulding. P. H. R. B. Lemon. *Foundry Trade Journal*, v. 101, July 1956, p. 113-115.

Behavior of the sand-resin mix during the process; influence of basic sand and resin properties in the formation of the shell. (E16)

462-E. Can Molding Sands Be Ruined by Using the Carbon Dioxide Process for Cores? *Henry Brutcher, Translation No.* 3771, 7 p. (From *Giesserei-Praxis*, no. 18, 1955, p. 376, 371-373.) Henry Brutcher, Altadena, Calif.

Possibilities for a typical mixture. (E18, E21, Fe)

463-E. CO_2 Speeds Coremaking. *Steel*, v. 139, Aug. 6, 1956, p. 111-114.

Cores and molds made with a mixture of sodium silicate and sand harden in seconds when carbon dioxide gas is passed through them and can be poured off immediately. (E21, E19)

464-E. Internal Chills in Moulds for Steel Castings. G. W. Miles. *Foundry*, v. 101, Aug. 1956, p. 139-146.

Factors such as composition and positioning of chaplets, core support and metal-flow requirements. Investigation of extent to which different-sized inserts and chaplets fuse with the castings. (E25, E19, CI)

465-E. Influence of Magnesium Content on Layer Porosity and Tensile Properties of Sand-Cast Aluminium-Magnesium Alloys, B.S. 1490-LM10 and B.S. (Aircraft) L.m. R. Jay and A. Cibula. *Foundry Trade Journal*, v. 101, Aug. 2, 1956, p. 131-142.

In bars containing 10.8 to 12% magnesium and poured from degassed melts, microporosity was uniformly distributed and the maximum tensile properties were obtained. (E25, Q27, Al, Mg)

466-E. Surface Defects in Some Sand-Cast Stainless Steels. Brian H. C. Waters, Carl Hayward and Howard F. Taylor. *Foundry Trade Journal*, v. 101, Aug. 2, 1956, p. 143-150.

Aluminum paint on mold surfaces gives promise as a means of preventing the "measles" defect. Explanation proposed. (E11, E25, SS)

467-E. Continuous Casting of Copper-Base Alloys to Finished Shapes. *Industrial Heating*, v. 23, Aug. 1956, p. 1576 + 10 pages.

Casting process, fabrication advantages. (E16, C5, Cu)

468-E. Reducing the Phosphorus Content of Foundry Iron. R. I. Higgins. *Iron & Steel*, v. 29, Aug. 1956, p. 373-378.

Basic physical and chemical considerations. (E25, CI)

469-E. (Czech.) **Chaplets in Gray Iron Castings, Their Dimensions and Use.** Miroslav Bednarik. *Slévarenstvi*, v. 4, no. 7; *Prace Ceskoslovenského Vyzkumu Slévarenského*, v. 3, no. 32, July 1956, p. 233-238.

Permissible specific pressure between the chaplet head and the casting wall and the permissible load of the chaplet stems were determined. (E19, E21, CI)

470-E. (Czech.) Melting of Gray Iron in Basic Cupola. *Slévarenství*, v. 4, no. 7; *Prace Ceskoslovenského Vyzkumu Slévarenského*, v. 3, no. 33, July 1956, p. 239-248.

With increasing basicity of the slag, the desulphurization of cast iron also increases, but only with melting difficulties. (E10, CI)

471-E. (French.) Determination of the Casting Time in the Foundry. M. Charles Trencklé. *Fonderie*, no. 126, July 1956, p. 251-266.

A theoretical study, with mathematical developments and practical conclusions based on modern physics, of the casting time of foundry specimens of whatever shape, size, or metal or alloy, with a view to eliminating the costly empirical approach in casting. (E general, A5)

472-E. (Italian.) The Making of Castings in Aluminum Bronze. *Fonderia*, v. 5, no. 6, June 1956, p. 287-294.

A study of the component metals of this alloy with variation of their quantities or with addition of other metals for practical purposes. Description of the casting process. Centrifugal casting. (E11, E14, Cu)

473-E. (Italian.) Die Casting of Zinc and Light Alloys. From OECE Report No. 155. III. *Fonderia*, v. 5, no. 6, June 1956, p. 321 + 4 pages.

Various methods used in removing castings, improvements made in recent years, solution of some technical difficulties in the feeding and the cooling process. (To be continued.) (E13, Zn, EG-a)

474-E. (Italian.) Technical Problems in Casting and Their Solutions. *Fonderia*, v. 5, no. 6, June 1956, p. 331, 333.

Use of synthetic sand, design of a furnace for the artificial aging of castings, determination of molding sand permeability. (E18, J27)

475-E. (Polish.) Carbon Steel Cast in Green Sand. Edmund Janicki. *Przeglad Odlewnictwa*, v. 6, no.7, July 1956, p. 194-202.

Chief problems connected with making molds for green sand casting; pouring and preparation of the steel. Role of porosity, release of gases, fluidity and resistance of the mold. Evaluation of methods of preparing gates. Properties of sands. (E19, E11, E18, E22, CI)

476-E. (Polish.) Green Molding Sand for Heavy Castings. Tadeusz Rzepa and Zdzislaw Wertz. *Przeglad Odlewnictwa*, v. 6, no. 7, July 1956, p. 202-208.

Advantages of green sand casting. Native materials for molds. Methods of testing mold materials. Means of improving durability of molds for heavy castings. Preparation of sands, proportions, mixing procedures. (E18, E19)

477-E. (Polish.) Production of Medium Sized Cast Iron Castings in Synthetic Sand. Edward Reszel. *Przeglad Odlewnictwa*, v. 6, no. 7, July 1956, p. 208-215.

Reasons for using synthetic sands, raw materials, composition and properties of synthetic sands, filling the mold, defects in synthetic sand castings and resulting economies. (E18, E11, CI)

478-E. The Risering of Nodular Iron. R. C. Shnay and S. L. Gertsman. *Canadian Metals*, v. 19, Aug. 1956, p. 48-51.

Effect of pouring temperature on shrink depth. (To be continued.) (E22, CI)

479-E. Aluminum Impellers Cast With Plaster Cores. Anthony Polizzoto. *Foundry*, v. 84, Sept. 1956, p. 104-107.

Acceptable cast aluminum impellers for aircraft must withstand a speed of 52,000 rpm. with a 20% overspeed. Plaster cores are the key to adequate internal smoothness. (E21, Al)

480-E. Casting Camshafts in Shell Molds. Kenneth L. Mountain. *Foundry*, v. 84, Sept. 1956, p. 124-128.

Mechanized line that features three automatically controlled blow-hot press machines of special design has more than doubled output of camshafts. (E16)

481-E. Sand Control Important in Production of Chemical Castings. Edwin Bremer. *Foundry*, v. 84, Sept. 1956, p. 129-133.

Accurate control of molding sand properties was found to be essential in production of high-silicon iron and alloy steel chemical castings. (E18, CI)

482-E. Magnesium Wing Sections Cast on Production Basis. Lewis B. Reed. *Foundry*, v. 84, Sept. 1956, p. 134-137.

Folding wing section for guided missile weighs 163 lb. A one-piece, hollow-cast part, it requires no machining on the skin. (E11, Mg)

483-E. Pewter Castings Produced With Antique Molds. Harold E. Bourassa. *Foundry*, v. 84, Sept. 1956, p. 210, 213.

History of the art, types of pewter, pewter casting procedure. (E12, Sn)

484-E. Development and Application of a Foundry Test for Assessing Shrinkage Behaviour in Grey Cast Iron. J. Grice and J. T. Berry. *Foundry Trade Journal*, v. 101, Aug. 16, 1956, p. 159-170.

Effect of change of feeder-volume surface-area ratio and depth of unsoundness in a 6-in. side cube in a medium-phosphorous gray iron. Temperature gradients during solidification and corresponding shrinkage defects. (E25, CI)

485-E. Chalk Talk on Diaphragm Molding. T. E. Barlow. *Modern Castings*, v. 30, Sept. 1956, p. 24-27.

Principles of a molding method which distributes pressure evenly over entire mold regardless of its size. (E19)

486-E. Surface Flowability—Key to Smoother Castings. James McConachie and H. H. Fairfield. *Modern Castings*, v. 30, Sept. 1956, p. 30-32.

Finishes are directly correlated with loose sand flowability. The Kennedy flowability test is a practical guide in the formulation and control of sand mixtures. (E18)

487-E. A Tensile Bar Shell Mold for Light Alloys. R. C. Harris and K. L. Herrick. *Modern Castings*, v. 30, Sept. 1956, p. 49-51.

Complications of thermal gradients and solidification rates have been met with new design. (E16, E25, EG-a)

488-E. New Nodular Iron Process. Harry K. Ihrig. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 7, 1956, 13 p.

Process uses the halides of alkali, or alkali-earth metals, in combination with reducing agents such as calcium. Chemical analyses, mechanical properties and photomicrographs of such nodular irons are given. (E25, Q general, CI)

489-E. (Dutch.) The Hardening of Molds and Cores of Cement Sand by Carbon Dioxide. I. The Hardening Process. H. G. Levelink II. Practical Application of Carbon Dioxide Through Pipes. J. P. G. Bruschke. *Metalen*, v. 11, no. 15, Aug. 15, 1956, p. 322-326.

Principles and applications of the carbon dioxide treatment or cement sand where, with only one or two core-boxes, continual production of heavy cores has been obtained. (To be continued.) (E18)

490-E. (Hungarian.) Basic Materials of Core-Bonding Oils and the Technology of Oil-Bonded Cores. Gyorgy Hevenesi and Janos Szekeres. *Öntöde*, v. 11, no. 7, July 1956, p. 145-155.

Hungarian investigations by various methods, such as cold tests, hot tests, chemical examination and physicochemical determinations. Types of bonding agents, their setting mechanism. Extensive experimental data. (E21)

491-E. (Italian.) The Melting and Casting of Bronzes and Brasses. *Fonderia*, v. 5, no. 7, July 1956, p. 353-358.

Critical review of recent experimental work. Recommends best practical methods. (E general, Cu)

492-E. (Book.) The Running and Gating of Sand Castings. R. W. Ruddle. 183 p. 1956. Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, England.

A review of the literature, covering experimental methods of studying flow of metals, fluid dynamics, and various types of gating systems. (E22, E11)

493-E. (Book-German.) The Foundry and Its Techniques. W. Rapp and M. Pasternak. 247 p. 1955. Fachbuchverlag, Leipzig.

A handbook for foundry workers. Casting steel, gray iron, and malleable iron. Smelting furnaces for steel and cast iron. Change in alloy components in remelting. Nonferrous metals. Molding magnesium. Corrosion and surface protection of magnesium alloys. (E general)

F

Primary Mechanical Working

197-F. Progress in Strip. *British Steelmaker*, v. 22, Aug. 1956, p. 235-239.

Details of an expansion program for three British steel plants. (F23, ST)

198-F. Deformability of Transformer Sheet in Cold Rolling. G. N. Shubin, V. A. Shadran, and N. I. Lapkin. *Henry Brutcher, Translation No.* 3627, 5 p. (From *Fizika Metallov i Metallovedenie*, v. 1, no. 1, 1955, p. 180-184.) Henry Brutcher, Altadena, Calif.

Plastic properties data are vital for good rolling. Effects of variables in cold rolling. (F23, Q24, AY)

199-F. Thermal and Mechanical Service Conditions of Hot Extrusion Tools. K. Laue. *Henry Brutcher, Translation No.* 3748, 12 p. (Abridged from *Zeitschrift Metallkunde*, v. 46, no. 1, 1955, p. 1-6.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 72-F, 1955. (F24)

200-F. Russians Hot Roll Gears on Production Mill. A. J. Steiger. *Iron Age*, v. 178, Aug. 23, 1956, p. 104-106.

Gears of many types are rolled hot on a production mill. Spur gears are made by hot-rolling teeth in long billets, then slicing off individual gears. (F23)

201-F. Practical Approach to Coil Splicing. R. E. Morton. *Iron and Steel Engineer*, v. 33, Aug. 1956, p. 118-123; disc., p. 123-124.

Successful continuous production processes depend on successful splicing of smaller units. Welds should be sound and ductile to avoid later breakdowns; time element for welding must be short to maintain line speed and minimize work storage and holding problems. (F23, K1)

202-F. Tonnage Heating by Induction. Michael C. D. Hobbs and R. S. Segsworth. *Iron and Steel Engineer*, v. 33, Aug. 1956, p. 125-131; disc., p. 131.

Induction heating has important applications in tonnage production. It offers solutions to problems which involve mechanization, space and working conditions. In many cases adoption can be justified on costs alone. (F21)

203-F. (Czech.) **Comments on Flame Straightening.** *Strojirenska Vyroba*, v. 4, no. 6, June 1956, p. 238-244.

Advantages of the method include rapid, localized heating to a certain temperature, the degree depending on the size and type of the deformation. Effect of heating on properties of the metal straightened. Factors to consider in using the method. (F29)

204-F. (German.) **Effect of Impurities on the Rollability and the Properties of Zinc.** E. Pelzel. *Metall*, v. 10, no. 15-16, Aug. 1956, p. 697-700.

Effects of small tin contents on high-purity zinc and zinc with 1% lead or 1% lead and 0.03% cadmium. (F23, Q23, Zn)

205-F. (German.) **Inquiries Into the Forgeability of Difficultly Workable Steels.** Georg Juretzek and Rudolf Kuhn. *Neue Hütte*, v. 1, no. 7, July 1956, p. 390-399.

Influence of variables. Tests for determination of forgeability. The reheating of high speed steel and its influence upon surface defects. (F22, TS, AY)

206-F. Experiments in Plane-Strain Extrusion. W. Johnson. *Journal of the Mechanics and Physics of Solids*, v. 4, Aug. 1956, p. 269-282.

Extrusion experiments of lead and aluminum with several semi-angle dies at various reductions. Resulting values were compared with those predicted by slip-line field methods. (F24, Pb, Al)

207-F. Precision Forgings Reduce Machining Costs. L. M. Christensen. *SAE Journal*, v. 64, Aug. 1956, p. 34-38.

Comparison of identical piece-assembled structures and single-piece forgings show that the forgings are lighter weight, structurally stronger, require less time to manufacture and reduce cost when mass produced. (F22, G17, SS, Ti)

G
Secondary Mechanical Working

307-G. Machining Light-Alloys. *Aircraft Production*, v. 18, Aug. 1956, p. 318-324.

Applications of special cutting tools, progressive cut milling, profiling thin-wall tubes. (G17, T24, EG-a)

308-G. Mechanism of Action of Active Agents in the Cutting of Metals. G. I. Epifanov, N. A. Pleteneva and P. A. Rebinder. *Henry Brutcher, Translation No.* 3424, 7 p. (From *Doklady Akademii Nauk SSSR*, v. 97, no. 2, 1954, p. 277-279.) Henry Brutcher, Altadena, Calif.

Disintegration as result of catalysis of decomposition of cutting agents by the metal, and diffusion of the decomposition products, particularly hydrogen, into metal lattice. (G21)

309-G. Machining Hard and Brittle Materials. R. C. Hall. *Metal Progress*, v. 70, Aug. 1956, p. 78-80.

Laboratory equipment necessary to cut or machine hard or brittle materials by the electric spark method is simple and inexpensive to build. Metal removal rate is low but the cut surface is free from burrs and strain. (G17)

310-G. Prediction of Drawing Properties From Tensile Tests. E. N. Ludington. *Metal Progress*, v. 70, Aug. 1956, p. 93-96.

The load required to draw cylindrical cups and the maximum reduction possible can be predicted quite accurately from the ultimate tensile properties of the original sheet. (G4, Q27)

311-G. Power Spinning Conical and Tubular Parts. *Product Engineering*, v. 27, Aug. 1956, p. 135-140.

Advantages and limitation over other metalworking processes. Applications, effect on strength, hardness and fatigue of metals, tolerances, finishes and tool costs. (G13)

312-G. Metal Flow-Turning. A Modern Development of an Historic Process. R. G. Longley and W. Hadley. *Sheet Metal Industries*, v. 33, no. 352, Aug. 1956, p. 519-529.

Process is similar to metal spinning but actually involving cold flow of the metal. (G13)

313-G. Spark-Machining Process and Some Typical Applications. J. L. Adcock. *Sheet Metal Industries*, v. 33, no. 352, Aug. 1956, p. 530-535; disc., p. 535-536.

Compares electrolytic, electro-arcing and electro-sparking processes. (G17)

314-G. Some Investigations Into the Deep Drawing and Spinning of Non-Ferrous Metals. John A. Grainger. *Sheet Metal Industries*, v. 33, no. 352, Aug. 1956, p. 537-545, 563.

Details of the marforming and hydroform processes. (G4, G13)

315-G. New Technique: Lead in Steel Forgings. *Steel*, v. 139, Aug. 13, 1956, p. 100-101.

Properties and advantages of leaded steel. Tool life is increased and machining simplified. (G17, Pb, AY)

316-G. Finish Grind With a Wet Belt. *Steel*, v. 139, Aug. 13, 1956, p. 114-115.

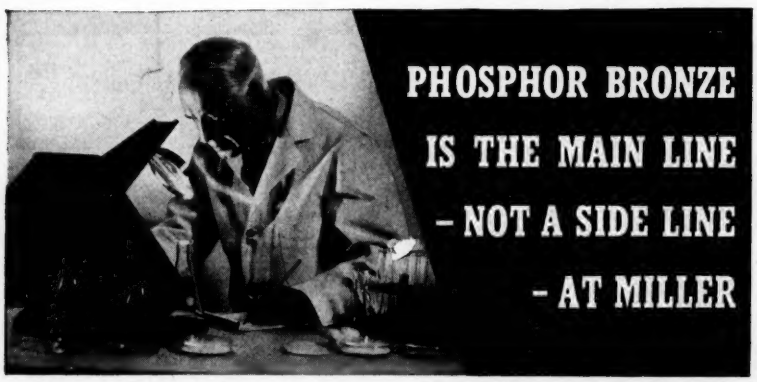
Construction and operation of pneumatic grinding fixture mounted on an automatic hydraulic in-feed. Greater flexibility, faster production and closer tolerances are advantages claimed over conventional grinding. (G18)

317-G. The Cold Forming of Aluminium Alloys. D. A. Barlow. *Welding and Metal Fabrication*, v. 24, Aug. 1956, p. 286-289.

Data showing the maximum amount of deformation of which a material is capable without failure for each type of forming operation and for each alloy and temper. (G general, Al)

318-G. (German.) **Effect of Cutting Conditions on the Surface Quality From an Economic Point of View.** Heinz Christoph. *Schweissen und Schneiden*, v. 8, no. 7, July 1956, p. 230-237.

Measuring equipment, conditions for constructive oxygen-cutting, standardization, influence of feed and of oxygen pressure, cost comparison. (G22)



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319-G. Producing Magnesium Impact Extrusions. John Alico. *Light Metal Age*, v. 14, Aug. 1956, p. 20-23.
Impact extrusion methods, design consideration. (G5, Mg)

320-G. The Machinability of Steel Casting Surfaces. *Steel Founders' Society of America, Research Report No.* 37, Aug. 1956, 36 p.
Effect of heat treatment, welding practices and variations in casting and molding practices. (G17, J general, K general, E general, CI)

321-G. Tool Considerations in Forming the Austenitic Stainless Steels. Lester F. Spencer. *Steel Processing*, v. 42, Aug. 1956, p. 453-461, 474.
Characteristics of austenitic stainless steels, cold reduction effects, fabrication methods and steel tempers, die material considerations, surface finish of parts, available die materials other than tool steels. (G general, SS)

322-G. Flange Wrinkling in Deep-Drawing Operations. B. W. Senior. *Journal of the Mechanics and Physics of Solids*, v. 4, Aug. 1956, p. 235-246.
Critical dimensions and number of waves are predicted on the bases of the stress-strain curve of the material and the flange geometry. (G4, Q25)

323-G. Milling Steel. How to Get the Most From Carbide Cutters. F. W. Lucht. *Tool Engineer*, v. 37, Sept. 1956, p. 103-108.
Optimum performance is the result of correct tool, fixture and machine design, as well as using correct grades of carbides and recommended feeds and speeds. (G17)

324-G. (Book.) **Forming Magnesium.** 144 p. Dow Chemical Company, Midland, Mich.
Basic data on numerous forming methods; notes on selection of alloys, cleaning, assembly protection, and safety recommendations. (G general, Mg)

H
Powder Metallurgy

118-H. Sintered Friction Materials. W. Cegielski. *Henry Brutcher, Translation No.* 3711, 9 p. (Abridged from *Prace Imh*, v. 7, no. 7, 1955, p. 17-23.) Henry Brutcher, Altadena, Calif.
Previously abstracted from original. See item 115-H, 1955. (H general)

119-H. Aluminum-Base Materials Produced by Powder Metallurgy. G. Wassermann and R. Weber. *Henry Brutcher, Translation No.* 3741, 10 p. (Abridged from *Zeitschrift Metallkunde*, v. 47, no. 2, 1956, p. 74-78.) Henry Brutcher, Altadena, Calif.
Previously abstracted from original. See item 68-H, 1956. (H14, Al)

120-H. Infiltration of TiC Skeletons. Herman Blumenthal and Ronald Silverman. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 977-981.
Infiltrability of a porous TiC compact, produced by powder metallurgy technique, depends on the capillarity of the compact and the surface condition and nature of the individual particles. (H16, Ti)

121-H. (Czech.) **Producing Protective Atmospheres by Partial Burning of Coke Gas for Hot Working Metals.** J. Belak. *Hutnik*, v. 6, no. 6, June 1956, p. 178-180.
Experiments in the use of partially burned coke gas for producing a protective atmosphere in powdered iron technology. Proportions of elements to be used. (H15, J2, Fe)

122-H. (Czech.) **On the Processes of Sintering Carbides by Liquid Phase.** Bohuslav Cech. *Hutnické Listy*, v. 11, no. 7, July 1956, p. 419-424.
Demonstrates that crystallites grow, having size of the order of 1 mm. Explains relation between structure and important properties of sintered carbides. (H15, N3, Cr, Co, W)

123-H. (Dutch.) **Copper and Copper Alloys.** W. G. R. de Jager. *Metalen*, v. 11, no. 13, July 16, 1956, p. 290-292.
Data on powder metallurgy, applications, pressing and sintering. (To be continued.) (H14, H15, Cu)

124-H. (German.) **Production, Properties, and Field of Application of Aluminium Powder.** Carl Schlenk. *Aluminium*, v. 32, no. 8, Aug. 1956, p. 486-490.
Powder production methods. Applications in the paint and plastics industries, and the production of foamed concrete. Sintered aluminum powder metallurgy. (H10, H11, T29, Al)

125-H. Powder Metallurgy. I. J. F. C. Morden. *Metal Industry*, v. 89, Aug. 17, 1956, p. 123-126.
Powder characteristics, particle size distribution, sedimentation methods. (To be continued.) (H11)

126-H. (Dutch.) **Copper and Copper Alloys.** W. G. R. deJager. *Metalen*, v. 11, no. 15, Aug. 15, 1956, p. 329-334.
Manufacture of articles from copper plus tin, nickel or other metal powders, molding and sintering processes, shrinkage, various qualities obtained. (H10, H14, H15, Cu)

J
Heat Treatment

221-J. Austempering. *Edgar Allen News*, v. 35, July 1956, p. 137-138.
Procedures, advantages and limitations. (J26)

222-J. Stress Relief Test for Titanium. Harold Bernstein and Eugene A. Gough. *Steel*, v. 139, Aug. 6, 1956, p. 110.
Test is a simple beam loading of a sample. By measuring deflection, initial and permanent set, you can determine amount of stress relief. (J1, Ti)

223-J. Another Look at Nitriding. Howard E. Boyer. *Steel*, v. 139, Aug. 20, 1956, p. 134-136, 138, 140.
The latest techniques in ammonia gas nitriding, proper testing methods and the most recently discovered properties of nitrided steel parts. (J28, ST)

224-J. Ultrasonic Quenching: It's New, More Effective. T. J. Bulat. *Iron Age*, v. 178, Aug. 30, 1956, p. 83-85.
Ultrasonic quenching provides increased hardness. No amount of quench-oil agitation can produce the same quenching effectiveness. (J26)

225-J. Quenching as a Heat Transfer Problem. V. Paschkis and G. Stolz, Jr. *Journal of Metals*, v. 8, sec. 1, Aug. 1956, p. 1074-1075.
Summarizes experimental results. (J26)

226-J. Further Work on the Boron-Hardenability Mechanism. C. R. Simcoe, A. R. Elsea and G. K. Manning. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 984-988.
It was found that a critical boron content exists which yields the maximum boron-hardenability effect in hypo-eutectoid steels; hardenability of boron steels with boron contents between 0.00005 and 0.0017% was dependent on the boron content, austenitizing temperature, quenching temperature and austenite grain size. (J26, ST)

227-J. Effect of Prolonged Heating at High Temperature on the Hardenability of Boron-Treated Steels. R. M. Goldhoff, R. Speiser and J. W. Spretnak. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 1, Aug. 1956, p. 1091. (J26, ST)

228-J. Isothermal Heat Treating. V. H. Erickson. *Metal Treating*, v. 7, July-Aug. 1956, p. 2-4.
Isothermal annealing, austempering, martempering and modified martempering. (J23, J26)

229-J. The Metallographic View. XXV. Surface Decarburization—Partial and Total. H. E. Boyer. *Steel Processing*, v. 42, Aug. 1956, p. 462-463.
In many metallurgical operations the decarburization of a surface is described by two depth of attack values: maximum effected depth, which is the total depth of any detectable decarburization, and a smaller depth value which reports the extent of total decarburization of the structure. (J28, ST)

230-J. (French.) **Some Metallurgical Aspects of the Quenching of Light Alloy Extruded Products.** M. Renouard and J. Navarro. *Revue de Métallurgie*, v. 53 no. 7, July 1956, p. 522-528.
Presents different ways of heating to obtain sufficient homogenization. Best conditions for a particular texture. (J26, EG-a)

231-J. (Russian.) **Decarburizing Annealing of Cast Iron Sheets.** E. G. Shumovskii. *Metallovedenie i Obrabotka Metallov*, 1956, no. 7, July 1956, p. 10-15.
Annealing sheet cast iron 0.8 to 1.0-mm. thick. Theoretical considerations. Need to reduce the original 3.2% to 3.5% carbon content to 0.08% to 0.05%. Tests and commercial methods of processing. (J28, J23, CI)

232-J. (Czech.) **Stress Relief by Flame Heating.** H. G. Kunz. *Zvaranie*, v. 5, no. 3, Mar. 1956, p. 73-79.
Principles, apparatus and applications. (J1, J2)

233-J. (Russian.) **Nitriding Titanium in Ammonia.** A. N. Minkevich, A. D. Taimer and Iu. A. Zotev. *Metallovedenie i Obrabotka Metallov*, no. 7, July 1956, p. 39-48.
Materials and methods; effects of various processing factors. Nitriding increases abrasion resistance and reduces toughness. Nitriding should be at temperatures below 800 to 900° C.; very little ammonia is needed. (J28, Q9, Ti)

234-J. (Italian.) **Physics for Founders.** Piero Lugiato. *Fonderia*, v. 5, no. 5, May 1956, p. 241-248.
A study of electric furnaces. Advantages of electric heating in metallurgy. Description of various types of electric furnaces, such as electric stoves with forced draft ventilation, arc furnaces and the like. (To be continued.) (J2)

235-J. Heat Treating Retaining Rings for Jet Engines. Arthur G. Portz. *Steel Processing*, v. 42, Aug. 1956, p. 467-469.
Normalizing, hardening and tempering of rings rolled from bar stock. (J26, J24)

236-J. Hardenability Factors for Hypereutectoid Low-Alloy Steels. E. J. Whittenberger, R. R. Burt and D. J. Carney. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 1008-1016.

Hardenability (multiplying) factors for carbon, manganese, silicon, chromium, nickel and molybdenum were developed for hypereutectoid low-alloy steels in which bainite is the first subcritical transformation product. These factors permit the calculation of 95, 80 and 50% martensite hardenability from chemical composition when steels with spheroidized structures are quenched from 1475, 1525 and 1575° F. (J26, N8, AY)

237-J. Dual Frequencies Put New Life in Heat Treating Line. *Iron Age,* v. 178, Sept. 6, 1956, p. 96-98.

Using 180 c.p.s. coils to preheat, 9600 c.p.s. coils to harden, this firm jacked up hourly production 50% without increasing layout size. (J2, J26, ST)

238-J. Temperability of Steels. L. D. Jaffe and Edward Gordon. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 14, 1956, 14 p.

A method was derived for calculating, from the composition of a steel, the temperature required to temper it to a desired hardness after quenching to martensite. (J29, ST)

239-J. (Polish.) **The Heat Interchange Coefficient During Cooling in the Hardening Process.** Wl. Loskiewicz and St. Gorczyca. *Hutnik,* v. 23, no. 7-8, July-Aug. 1956, p. 276-282.

A mathematical approach to an understanding of the cooling process in various cooling atmospheres. Influence of various factors on the coefficient of heat exchange. Determining the actual coefficient of heat exchange for oils, kerosene and salt solutions. (J2)

240-J. (Russian.) **Effect of Surface Hardening by Heating With Industrial-Frequency Currents on the Properties of the Working Rolls for Cold Rolling.** V. N. Novikov. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1956, p. 36-47.

As contrasted with high-frequency induction heating, regular currents give a deeper case without overheating and better microstructural results. Change in content of residual austenite in hardened steel in relation to tempering temperature. Service life of case-hardened rolls. (J2, M27, CI)

241-J. (Russian.) **High-Temperature Gas Carburizing of Steels.** G. M. Shuval, I. S. Lupakov and I. A. Fel'dman. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1956, p. 48-52.

Relation of carburizing rate and carbon-concentration curve to temperature. Relation of depth of cementation to period of soak at various temperatures. Effect of high-temperature carburizing on austenite grain growth and core microstructure. (J28, N8, ST)

K

Joining

442-K. Synthetic-Resin Bonding, the Use of Redux and Araldite Adhesives in the Australian Jindivik Aircraft. I. Constructions: Bonding Technique: Tooling Methods. G. D. Bennett. *Aircraft Production,* v. 18, Aug. 1956, p. 300-305.

Design considerations affecting the type of structure and the type of adhesive chosen; fabrication and tooling methods. (K12)

443-K. The Influence of Weld Faults on Fatigue Strength With Reference to Butt Joints in Pipe Lines. R. P. Newman. *Institute of Marine Engineers, Transactions,* v. 68, June 1956, p. 153-172.

The root zone of welds, with and without backing rings, exercises a predominant influence on fatigue behavior. Except in the case of lack of penetration, defects show no significant effect on fatigue strength. (K1, K2, Q7)

444-K. Welding of Steam and Feed Pipework for Marine Installations. J. Chamberlain and W. L. Roe. *Institute of Marine Engineers, Transactions,* v. 68, June 1956, p. 173-182; disc., p. 183-192.

The welding, heat treatment and nondestructive testing of joints in alloy steels made by manual methods only. (K1, T22, S13, AY)

445-K. Epoxy-Base Adhesives in the Aircraft Industry. William Bandaruk. *SPE Journal,* v. 12, Aug. 1956, p. 20-23, 50.

Advantages include ease of application, excellent basic adhering qualities to many kinds of metallic and nonmetallic surfaces, simplicity and versatility in compounding and development, resistance to aircraft fluids and environmental conditions and satisfactory physical properties. (K12, T24)

446-K. Welding of Austenitic Chromium-Nickel Steels and Other Heat Resisting Alloys. E. P. L'vova. *Henry Brutcher, Translation No.* 3712, 12 p. (From *Svarochnoe Proizvodstvo,* no. 11, 1955, p. 27-31.) Henry Brutcher, Altadena, Calif.

Review of American and British literature and comparison with Russian studies. (K general, SG-h, SS)

447-K. Argon-Arc Welding of Commercially Pure Titanium. E. A. Taylor and D. C. Moore. *Welding and Metal Fabrication,* v. 24, Aug. 1956, p. 268-280.

The influence of weld backing, argon flow and the use of supplementary and modified shrouds on weld quality. Technique for retstricting atmospheric contamination. Examination of welds. (K1, Ti)

448-K. Nickel-Manganese Brazing of Steel. R. A. Gustafson. *Welding and Metal Fabrication,* v. 24, Aug. 1956, p. 290-291.

Controlled atmosphere furnaces yield joints with good corrosion resistance and high-temperature strength. (K8, Ni, Mn, ST)

449-K. Ultrasonic Welding. J. Byron Jones and James J. Powers, Jr. *Welding Journal,* v. 36, Aug. 1956, p. 761-766.

Elastic vibratory energy is introduced into the areas to be joined to effect solid-state bonding between similar and dissimilar metals. (K6)

450-K. Welded Overlay Rotating Bands. Frank W. Hussey and Irving G. Betz. *Welding Journal,* v. 35, Aug. 1956, p. 767-775.

Rotating bands applied to projectiles by the inert-gas-shielded metal-arc process with the aid of an auxiliary filler wire have shown great promise in ballistic tests, in technical feasibility and in economy. (K1, Cu)

451-K. Comparative Properties of Electrodes for Arc Welding Austenitic Manganese Steels. W. L. Lutes and H. F. Reid, Jr. *Welding Journal,* v. 35, Aug. 1956, p. 776-783.

There are significant quantitative differences in the properties of four basic types of materials commonly used for fabrication or build-up. (K1, SS)

452-K. (German.) **Transformation and Weldability of Low Alloy Steels.** Wilhelm Hofmann and Reinhard Müller. *Schweissen und Schneiden,* v. 8, no. 7, July 1956, p. 237-240.

Measuring instruments, model experiments and welding experiments. (K9, N8, AY)

453-K. Types of Fluxes and Alloys for Different Materials. Soldering and Brazing. R. C. Jewell. *Metal Industry,* v. 89, Aug. 3, 1956, p. 83-86.

Materials used for soldering and brazing of a variety of metals and alloys. (To be continued.) (K7, K8)

454-K. Soldering and Brazing. R. C. Jewell. *Metal Industry,* v. 89, Aug. 10, 1956, p. 103-106.

Types of fluxes and alloys for different materials. (K7, K8)

455-K. Three Ways to Weld Titanium. J. W. Cunningham. *Steel,* v. 139, Aug. 27, 1956, p. 84-86.

At temperatures over 1000° F., the metal absorbs nitrogen and oxygen from air, which makes it too brittle. Inert gas offers satisfactory protection. (K1, Ti)

456-K. (Czech.) **Welding of Gray Cast Iron With the Electrodes VUS.** Ladislav Lakatos. *Slévarenstvi,* v. 4, no. 7, July 1956, p. 213-218.

Necessity of considering metallurgical processes of welding, and a thorough knowledge of solidification dynamics of welding metals and thermal expansion. (K1, N12, CI)

457-K. (Czech.) **Flame Welding Heavy Gray Iron Castings Heated With Propane-Butane Burners.** Rudolf Halbich. *Zvaranie,* v. 5, no. 3, Mar. 1956, p. 87-90.

Method makes possible welding which otherwise is very difficult. Construction and use of the burners. Some examples of castings welded by this method. (K2, CI)

458-K. (German.) **Inert Gas Welding of Copper and Its Alloys.** Lothar Wolff and Wilhelm Mantel. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 459-465.

Equipment and work-locating fixtures for argon-arc and sigma welding. Quality factors. (K1, Cu)

459-K. (German.) **Testing and Evaluation of Autogenous Welded Joints of Zinc and Zinc Alloys.** Nikolaus Ludwig. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 473-477.

Factors to be considered in development of testing methods. Evaluation of gas-welded plate joints. (K9, K2, Zn)

460-K. (German.) **State of Magnesium Welding.** Ernst Rubo. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 466-473.

Methods for welding magnesium and its alloys, and their fields of application. (K general, Mg)

461-K. (German.) **Progress in Fusion Welding Nonferrous Metals and Alloy Steels.** Richard Dümpelmann. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 478-486.

Survey of processes in use, significance of the various methods and of the composition of the welding wire for aluminum, copper, nickel and their alloys as well as cast iron and alloy steels. (K1, K2, K3, EG-a, AY)

462-K. (German.) **Behavior of Welded Light Metals of the Type AlZnMg 1.** Albrecht Müller-Busse. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 486-490.

Original ultimate strength values are reached again after approximately three months of aging at room temperature. Fatigue strength slightly declines. Corrosion resistance is good. (K1, K2, K9, Al)

463-K. (German.) **Wettability of Solders.** Albert Keil. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 491-493.

Wetting of the solid metal surface is facilitated by interfacial reactions with the liquid solder. Wetting of ceramic materials by liquid metals is also possible if diffusion, oxidation or reduction processes take place between ceramic material and metal. (K7, P10)

464-K. (German.) **Hard Soldering in Protective Atmosphere in an Electric Resistance Furnace.** Gerhard Simon. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 494-499.

Appropriate equipment such as hard soldering furnaces, control equipment and protective gas generators. (K7)

465-K. (German.) **Copper and Copper-Alloy Welding Materials, and Hard Solders.** Hans Klein. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 499-506.

Data on composition, physical properties, ultimate stress values and suitability for the different welding processes and use on the various base metals. (K general, T5, Cu)

466-K. (German.) **Problems of Production of Structural Metal Joints With Plastics.** Konrad Meyerhands. *Zeitschrift für Metallkunde,* v. 47, no. 7, July 1956, p. 506-516.

Mode of action and composition of the customary metal bonding agents; examples of advantages offered by resin-bonded metals. (K12)

467-K. (German-French.) **Attempt at Determination of Bonding Temperature.** René D. Wasserman and G. M. A. Blanc. *Zeitschrift für Schweisstechnik,* v. 46, no. 8, Aug. 1956, p. 182-187.

Method of determining minimum brazing temperature to which base metal must be brought in order to effect a good bond with the molten filler metal. (K8)

468-K. (Russian.) **The Aging of Tin-Lead Solders and of Joints Made With Them.** A. S. Medvedev. *Metallovedenie i Obrabotka Metallov,* no. 7, July 1956, p. 16-23.

Changes in mechanical properties of Russian solders and joints. (K7, Q23, Sn, Pb)

469-K. (Slovak) **Contribution to the Seam Welding of Mild Carbon Steels.** *Zvaranie,* v. 5, no. 3, Mar. 1956, p. 79-82.

Experiments made in welding 2-mm. steel sheet. Problems presented by occluded gases, problems of varying chemical composition of steels which are supposed to be uniform, and how this affects the weldability. (K3, K9, CN)

470-K. (Slovak.) **Welding Gray Cast Iron With VVS-Bimetal Electrodes.** Ladislav Lakatos. *Zvaranie,* v. 5, no. 6, June 1956, p. 182-187.

A copper-iron electrode (iron wire coated with copper) is used in repairing casting defects. Problems of welding cast irons. (K1, T5, Cu, Fe, CI)

471-K. (Spanish and English.) **Wedge Test Piece for the Definition of a Steel With Regard to Its Electric Arc Welding.** Felipe Angel Calvo Calvo. *Ciencia y Tecnica de la Soldadura,* v. 6, no. 30, May-June 1956, 21 p.

Concludes that there is no such property as "weldability". Wedge test pieces indicate the transformation pearlite to eutectoid austenite to martensite. (K9, ST)

472-K. Welding Technology Since 1950. H. J. Nichols. *Canadian Metals,* v. 19, Aug. 1956, p. 18 + 5 pages.

Recent developments contributing to improvement of welding mainly through higher speeds and lower costs. (K1)

473-K. How to Weld Special Corrosion-Resistant Stainless Steels. G. J. Gibson. *Industry & Welding,* v. 29, Sept. 1956, p. 66-68, 71-73.

Joint design data, assembly methods, welding dissimilar metals, tubing, pipe and clad material and cleaning of welds. (K1, SS)

474-K. How to Pick Electrodes for Production Welding. J. E. Hinkle. *Iron Age,* v. 178, Sept. 6, 1956, p. 104-106.

Since time and labor constitute the major portion of cost, the fastest electrode that meets job specifications is desired. (K1, CN)

475-K. How to Braze Stainless. I. H. M. Webber. *Steel,* v. 139, Sept. 3, 1956, p. 94-95, 97, 100.

Techniques for brazing stainless steels with troublesome constituents such as silicon, titanium and aluminum. (K8, SS)

476-K. (Russian.) **Intensification of the Heating of Metal in Contact Butt Welding Through Intensifying the Oxidation Reactions.** V. K. Lebedev and S. I. Kuchuk-Iatsenko. *Avtomaticheskaia Svarka,* v. 9, no. 3, May-June 1956, p. 36-43.

Blowing with air or air-oxygen mixtures intensifies heating and improves quality of welded joints. (K1, CN)

477-K. (Russian.) **Thermal Expansion of Metal as a Regulating Parameter During Spot Welding Duralumin.** Iu. A. Pachentsev. *Avtomaticheskaia Svarka,* v. 9, no. 3, May-June 1956, p. 65-71.

A movable electrode shows the expansion of the metal during the welding process. Best results are achieved when welding current is shut off slightly before the maximum expansion is reached. (K3, P11, Al)

478-K. (Russian.) **Welding of Austenitic Oxygen-Resistant Steels EI-530, EI-628, and EI-629.** A. S. Astaf'ev and A. V. Russiian. *Avtomaticheskaia Svarka,* v. 9, no. 3, May-June 1956, p. 72-78.

Automatic and manual electric arc flux welding. Chemical composition of the steels and mechanical properties, including resistance to deformation. (K1, Q23, SS)

479-K. (Book.) **Development of Coated Arc Welding Electrodes Which Shall Produce Welded Joints Heat Treatable to Strength Levels of 220,000 to 240,000 and 260,000 to 280,000 Pounds Per Square Inch.** D. C. Smith. 30 p. Harnischfeger Corp., Electrode Division, Research Laboratory, 2151 S. Robinson Ave., Milwaukee 7, Wis.

Production of electrodes to deposit sound weld metal that will develop physical properties comparable to those of alloy base metals when heat treated under the same processes. (K1, T5, AY)

480-K. (Book—French.) **Resistance Electric Welding and Its Application in Aircraft Industry.** G. Moressée. 366 p. 1954. Génin, Paris, France.

Review of welding applications in the aircraft industry in Europe and the United States; includes materials, welding equipment, and design data. (K3, T24)

L

Cleaning, Coating and Finishing

609-L. (English.) **The Electrode Process in Metal Deposition From Aqueous Solutions.** Einar Mattsson. *Acta Polytechnica (Chemistry Including Metallurgy Series),* v. 6, no. 12, 1955, 56 p.

On electrodeposition, the cathode potential decreases below its equilibrium value. This is called polarization and is dependent on current density, temperature, time, the nature of the metal, and the composition of the solution. (L17)

610-L. A Survey of Literature on Hot Dip Galvanizing, 1950-1955. J. J. Sebisty. *Canada, Department of Mines and Technical Surveys, Mines Branch Research Report No.* PM202, Apr. 1956, 60 p.

Composition and surface condition of the steel and the composition of the bath. (L16, ST, Zn)

611-L. Vacuum Metallizing: The Big Boom Is On. *CEC Recordings,* v. 10, July-Aug. 1956, p. 6-7.

Vacuum coating is providing better-looking products at extremely low costs. (L25)

612-L. Corrosion Control Practices for Pipe-Type Cables on the Detroit Edison System. W. A. Sinclair. *Corrosion,* v. 12, Aug. 1956, p. 385-388.

Pipes are covered with ½-in. thick coating of somastic, buried, and tested with 500-volt megger. A ground surface survey is made when irregularities are detected. (L26)

613-L. Mechanism of Surface Impregnation of Iron and Steel With Boron. G. V. Samsonov and N. Ya. Tseitina. *Henry Brutcher, Translation No.* 3745, 7 p. (From *Fizika Metallov i Metallovedenie,* v. 1, no. 2, 1955, p. 303-306.) Henry Brutcher, Altadena, Calif.

Micrographic and X-ray studies of boron diffusion into Armco iron and steel. (L15, N1, M22, ST, B)

614-L. Phosphating of Wire and Wire Rod Preparatory to Cold Drawing and Its Importance for the Wire Industry. L. Kus. *Henry Brutcher, Translation No.* 3717, 8 p. (Abridged from *Hutnik, (Poland),* v. 22, no. 9, 1955, p. 318-324.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 376-L, 1956. (L14, F28)

615-L. Mechanism of Wash Primer Action. Jerome Kruger and M. C. Bloom. *Industrial and Engineering Chemistry,* v. 48, Aug. 1956, p. 1354-1360.

An investigation of the structure of wash primer film on an iron surface, its mechanism of formation, and its mode of action in retarding corrosion and increasing paint adhesion. (L26, Fe)

616-L. The Use of Gas in Vitreous Enamelling. *Industrial Finishing,* v. 9, July 1956, p. 676-680, 682-683.

Enamel frit production, cast-iron process, base coat application and treatment, metal preparation, enamel cover coat application and treatment, tests and inspection of vitreous enamel finishes. (L27, CI)

617-L. The Quality of Electro-Deposits. *Industrial Finishing,* v. 9, July 1956, p. 686, 688-689.

Pilot production lines, development of tests for control of bath, thickness test, chromium deposits. (L17, Ni, Cr)

618-L. Of Nickel Atoms, Ions and Electrons. W. A. Wesley. *Institute of Metal Finishing, Bulletin,* v. 6, Summer 1956, p. 87-106.

Nickel electrode reactions and the thermodynamic limitations within which their mechanisms must operate. (L17, P12, Ni)

619-L. Some Experimental and Practical Aspects of Heavy Rhodium Plating. F. H. Reid. *Institute of Metal Finishing, Bulletin,* v. 6, Summer 1956, p. 107-142.

Preparation of electrolyte, influence of composition and deposition factors on internal stress of deposits, factors affecting incidence of cracking. (L17, Rh)

620-L. Zinc-Rich Paint: A Coating for Problem Surfaces. D. E. Wilbur. *Iron Age,* v. 178, Aug. 9, 1956, p. 82-84.

Zinc-rich paints adhere even to corroded surfaces, also find use as welding primers. (L26, Zn)

621-L. Surface Treatment and Finishing of Light Metals. X. Sealing Anodic Oxide Coatings. S. Wernick and R. Pinner. *Metal Finishing,* v. 54, Aug. 1956, p. 53-58.

The chief sealing techniques consist of immersion in boiling water, solutions of dichromates or chromates, silicates, or metal salts which hydrolize in the coating to form hydroxides, such as nickel and cobalt salts, or in solutions of organic capillary active compounds. (L19, EG-a)

622-L. Covering Power in Chromium Plating Baths. Robert H. Rousselot. *Metal Finishing,* v. 54, Aug. 1956, p. 60-65.

Influence of the five independent variables with particular reference to the interdependence of temperature and mean current density. (L17, Cr)

623-L. Finishing Supplement: Bright Nickel Plating. E. Lütter. *Metal Industry,* v. 89, July 27, 1956, p. 65-67.

Some of the methods used to obtain sound, adherent, and bright deposits from various solutions. Results of tests made to ascertain the protective value of the coating. (L17, Ni)

624-L. Chromizing of Steel. E. Gasior. *Henry Brutcher, Translation No.* 3708, 13 p. (Condensed from *Prace Imh,* v. 7, 1955, p. 1-10.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 329-L, 1955. (L15, Cr, ST)

625-L. The Development of Nickel and Chromium Plating Since 1945. E. A. Ollard. *Product Finishing,* v. 9, July 1956, p. 116-128.

Chief advances were made in the use of organic bright nickel baths and improvements in methods of handling work. (L17, Ni, Cr)

626-L. The Future of Electroplating Solution Control. K. E. Langford. *Product Finishing,* v. 9, July 1956, p. 129-134.

Present analytical methods are evaluated and suggestions made for planning of future developments. (L17)

627-L. Development in Tin and Tin Alloy Plating 1946-1956. J. W. Price. *Product Finishing,* v. 9, July 1956, p. 135-142.

Acid and alkaline solutions; codeposition of tin with lead, copper, zinc, nickel and cadmium. (L17, Sn)

628-L. Ten Years of Research and Development in Anodising. A. W. Brace. *Product Finishing,* v. 9, July 1956, p. 143-153.

New materials, anodizing processes, bright anodizing, architectural applications of anodized aluminum, an automatic anodizing plant, continuous methods. (L19, T26, Al)

629-L. Non-Mechanical Methods of Metal Brightening. I. Stainless Steel. H. Silman. *Product Finishing,* v. 9, July 1956, p. 168-171.

Chemical and electrolytic polishing processes; stainless steel applications. (To be continued.) (L12, L13, SS)

630-L. Hot Dip Galvanizing 1946-1956. I. M. L. Hughes. *Product Finishing,* v. 9, July 1956, p. 181-193.

Review of technical literature, preparatory treatment, handling and heating methods, bath temperature and composition, formation of residuals and zinc recovery. (To be continued.) (L16, Zn)

631-L. The Decade's Developments in Vitreous Enamelling. J. C. Oliver. *Product Finishing,* v. 9, July 1956, p. 172-180.

New production methods, new base metals, thinner coating developments, low-firing enamels, chemical resistance, ceramic coatings and color improvements. (L17)

632-L. The Value of Rinse Control in Phosphate Coating Processes. Richard B. Stribley. *Product Finishing,* v. 20, Aug. 1956, p. 42-44, 46-47.

Water and chromic acid rinses and their effect on costs and quality. (L14)

633-L. Continuous Strip Gets Tight Coat. *Steel,* v. 139, Aug. 6, 1956, p. 118, 121.

Equipment and operation of continuous hot-dip galvanizing line. (L16, Zn, ST)

634-L. Copper Anodes for Electroplating. H. Bovet. *Henry Brutcher, Translation No.* 3738, 8 p. (From *Pro-Metal,* v. 7, no. 43, 1955, p. 452-456.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 280-L, 1955. (L17, Cu)

635-L. Chromium Plating of Cutting Tools. M. E. Gol'dshtein and V. M. Fridenson. *Henry Brutcher, Translation No.* 3720, 7 p. (From *Stanki i Instrument,* v. 26, no. 7, 1955, p. 26-28.) Henry Brutcher, Altadena, Calif.

Complete procedure for the controlled chromium plating of various tools to a thickness of 2-3 microns. (L17, Q9, Cr, TS)

636-L. Properties of Flame-Sprayed Zinc Coatings. E. Gebhardt and H. D. Seghezzi. *Henry Brutcher, Translation No.* 3751, 12 p. (Abridged from *VDI Zeitschrift,* v. 98, no. 2, 1956, p. 41-45.) Henry Brutcher, Altadena, Calif.

Particulars on spray control with wire and powdered zinc; physical and mechanical properties. (L23, P15, Q general, Zn)

637-L. Sulfidizing of Gray Iron and Steel. I. M. Engalychev and P. U. Zemskov. *Henry Brutcher, Translation No.* 3744, 6 p. (From *Vestnik Mashinostroeniya,* v. 36, no. 2, 1956, p. 46-48.) Henry Brutcher, Altadena, Calif.

Composition of sulfidizing solutions, applications of sulfidized metals. (L14, CI, ST)

638-L. Residual Stresses in Electrodeposits. A. T. Vagramyan and Yu. S. Tsareva. *Henry Brutcher, Translation No.* 3749, 13 p. (From *Zhurnal Fizicheskoi Khimii,* v. 29, no. 1, 1955, p. 185-193.) Henry Brutcher, Altadena, Calif.

Critical review of theories of residual stresses in electrodeposits. Phenomenon studied by the automatically recorded cathode flexure method. (L17, Q25)

639-L. (Russian.) **Nature of Surface Zones Arising During Diffusion of Chromium Into Iron.** G. N. Dubinin. *Zhurnal Tekhnischeskoi Fiziki,* v. 26, no. 6, June 1956, p. 1345-1350 + 2 plates.

Microstructure and microhardness of iron after gas chromation at 1200° C.; differences by zones, including peculiarities of separation zone. Effect of different cooling rates. (L15, M27, Q29, Fe, Cr)

640-L. Rubber-Bonded Abrasives Give New Bounce to Finishing. *Iron Age,* v. 178, Aug. 30, 1956, p. 92-94.

Available in four grits and a variety of sizes and shapes, rubberized abrasives help solve many special finishing problems. Abrasive-rubber blend cuts or polishes without digging in, tearing or drawing even the softest metals. It's unaffected by water or coolants and there's no time lost reloading wheels with fresh abrasive. (L10, G18)

641-L. Aluminizing Progress. H. E. Erstrom. *Light Metal Age,* v. 14, Aug. 1956, p. 24-27.

When designers, engineers, architects and others whose problems are to prevent corrosion of steel members, are fully acquainted with "Mollerizing", they will find that this method of coating steel is an answer to a great number of their problems. (L16, Al)

642-L. Some Tips on the Use of Protective Coatings for Springs. *Mainspring,* v. 16, Aug. 1956, 5 p.

Surface preparation, types of finishes, salt spray resistance. (L general)

643-L. Ball Burnishing. Arthur S. Kohler. *Metal Industry,* v. 89, Aug. 10, 1956, p. 107-109.

Process conditions when burnishing with steel balls. (L10, ST)

644-L. Use of Beryllium Oxide for the Beryllium Impregnation of Steel. V. A. Parfenov. *Henry Brutcher Translation No.* 3737, 4 p. (From *Metallovedenie i Obrabotka Metallov,* v. 2, no. 3, 1956, p. 17-19.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 460-L, 1956. (L15, Q9, M26, Be, ST)

645-L. (Czech.) **Diffusion Sulfide Process for Piston Rings.** Otakar Moravek. *Slévarenstvi,* v. 4, no. 7, July 1956, p. 209-213.

Advantages and possible use as a new process of chemical heat treatment not only for piston rings but also for other mechanical parts. (L15, CI)

646-L. (Czech.) **Comments on Stresses in Hard Facing.** Vaclav Linhart and Karel Lobl. *Zvaranie,* v. 5, no. 6, June 1956, p. 163-166.

Effects of austenitic chromium-nickel layers on the distribution and degree of stresses in the coating. Effects of various heat treatments on the stresses. (L24, Q25, J general, AY)

647-L. (Czech.) **New Processes in Manufacturing Hard Facing Electrodes.** Jaroslav Vidrma. *Zvaranie,* v. 5, no. 6, June 1956, p. 174-178.

Advantages and savings resulting from use of electrodes in which some of the alloy required is incorporated in the coating. Considerations of composition and thickness of the coating. (L24, T5)

648-L. (French.) **Progress in Electrolytic Polishing. Its Application to the Study of the Physical Properties of Materials.** I. Epelboin. *Corrosion et Anticorrosion,* v. 4, no. 5, May 1956, p. 166-171.

Anions, perchlorate baths and other electrolytic or chemical methods have been used successfully. This method can be applied to many metals. (L13)

649-L. (French.) Industrial Electrolytic Zinc Coating of Steel Sheet; Principal Advantages and Field of Application. G. Pieltain, J. Deheneffe and P. Lemal. *Corrosion et Anticorrosion*, v. 14, no. 7, July-Aug. 1956, p. 233-240.

Preparation, phosphating and chromating of steel sheet, description of tests, results of analysis and study of coating, improvement obtained and wide field of practical application. (L17, Zn, ST)

650-L. (French.) Vitrified Enamels on Light Metals. F. J. Biechler and J. J. Meynis de Paulin. *Corrosion et Anticorrosion*, v. 14, no. 7, July-Aug. 1956, p. 241-245.

Enamels containing lead oxide, alkali, lithium oxide, and silica show good results. They are fired at 530 to 540° C. (L27, Mg, Al)

651-L. (French.) Phosphating in Solvent Phase. J. Baudin. *Corrosion et Anticorrosion*, v. 14, no. 7, July-Aug. 1956, p. 252-258.

Easy method of phosphating in solvents such as ketones, alcohols and aldehydes. This method yields good results. (L14)

652-L. (German.) Sprayed-On Aluminium Coatings. H. Reininger. *Aluminium*, v. 32, no. 8, Aug. 1956, p. 480-485.

Historical review, summary of literature on practical experience, including effects of normal weathering, industrial atmospheres, ordinary and sea water, sea air and fuels. (L23, R3, R4, R7, Al)

653-L. (German.) Effect of Iron Inclusions on Zinc Attack. D. Horstmann. *Metall*, v. 10, no. 15-16, Aug. 1956, p. 701-708.

Determination of iron losses in the galvanization process, value of the zinc attack, effect of carbon, silicon, manganese, phosphorus, sulfur, aluminum and copper contents. (L16, M27, Zn, Fe)

654-L. (Italian.) Researches on the Chromium Content of the "Aluminum Blacks". Use of Radioactive Chromic Acid. L. Guerreschi and R. Romita. *Alluminio*, v. 25, no. 7-8, July-Aug. 1956, p. 333-336.

Shows that the chromium content of the "aluminum blacks", formed under the same electrochemical conditions is practically constant. (L21, S11, Cr, Al)

655-L. (Swedish.) What Are the Possibilities by Means of Polarization Measurements of Performing Improved and More Efficient Pickling Processes in the Steel Industry. K. H. Brakstad. *Jernkontorets Annaler*, v. 140, no. 7, 1956, p. 512-519.

Industrial pickling discussed on basis of laboratory polarization measurements. (L12, ST)

656-L. Flame Spraying of Metals and Plastics. G. R. Lawrance. *Corrosion Technology*, v. 3, Aug. 1956, p. 254-257.

Equipment, materials and methods of spray coating metals. (L23, Fe, Pb, Zn, Al, Sn)

657-L. Vacuum Metallizers Reach New Markets. P. J. Clough and J. H. Durant. *Iron Age*, v. 178, Sept. 6, 1956, p. 91-94.

With precisely controlled film thickness, the low-cost coating adheres well to metals and nonmetals alike. Formerly considered decorative, it is now valuable as a specialty coating. (L25, ST, Cu, Cr)

658-L. Silicone Protective Coatings in Metal Finishing. P. A. J. Gate. *Product Finishing*, v. 9, Aug. 1956, p. 48-51.

Silicone resin-based finishes offer a number of advantages, particularly where a combination of heat and weather resistance is required. Recent developments in this field are reviewed, along with details of several typical applications. (L26)

659-L. Non-Mechanical Methods of Metal Brightening. II. Aluminium. H. Silman. *Product Finishing*, v. 9, Aug. 1956, p. 52-60.

Use of chemical and electrolytic polishing methods for brightening aluminum. (L12, L13, Al)

660-L. Hot Dip Galvanizing 1946-1956. II. M. L. Hughes. *Product Finishing*, v. 9, Aug. 1956, p. 61-67.

Literature survey, covering galvanizing of sheet strip, wire and tube. (L16)

661-L. Elementary Topics for Research in Metal Finishing. IV. C. James. *Product Finishing*, v. 9, Aug. 1956, p. 75-85, 116.

Deals with preparatory cleaning, spraying, hot dipping, vacuum deposition and plastic coating. (L general)

662-L. (French.) Steel Corrosion Prevention by Metallic Coating and Especially by Hot Galvanizing. J. F. H. van Eijnsbergen. *Centre Belge d'Etude det la Corrosion, Rapport Technique*, no. 36, July 1956, p. 3-7; disc., p. 7-8.

Zinc, aluminum or cadmium coatings, methods used and influence of zinc thickness on capacity to withstand corrosion. (L16, ST, Zn, Al, Cd)

663-L. (German.) The Effect of Ultrasonics on Electrodeposition of Metals. A. Roll. *Metalloberfläche*, v. 10, no. 8, Aug. 1956, p. 230-233.

Qualitative and partly quantitative determination of the effects of ultrasonics at various frequencies on electroplating with nickel, silver and chromium. (L17, Ni, Ag, Cr)

664-L. (German.) Cleaning With Ultrasonics by Using Magnetostriction Oscillators. H. J. Collmick and K. Tesser. *Metalloberfläche*, v. 10, no. 8, Aug. 1956, p. 233-237.

Ultrasonics with frequencies between 20 and 30 kc., emitted by sheets of nickel with effective oscillation surfaces varying from 70 sq.-cm. to several hundred sq.cm., as the most effective and easily applicable cleaning method in industry. (L10)

665-L. (Russian.) Effect of Carbon on Resistance of Weld-Deposited Metal to Abrasive Wear. E. I. Leinachuk. *Avtomaticheskaia Svarka*, v. 9, no. 3, May-June 1956, p. 58-64.

Effect of carbon on hardness and resistance to wear of hard facing containing 0.17 to 2.54% carbon. (L24, Q9, CN)

M

Metallography, Constitution and Primary Structures

338-M. Electron Microscopy: Its Scope and Limitations. V. E. Cosslett. *Endeavour*, v. 15, July 1956, p. 153-165.

The instrument, applications in biology, medicine, metallurgy and solid-state physics and practical limitations. (M21)

339-M. X-Ray Study of Lattice Vibrations in Aluminum. C. B. Walker. *Physical Review*, v. 103, ser. 2, Aug. 1, 1956, p. 547-557.

The diffuse scattering of monochromatic X-rays by a single crystal of aluminum at 300° K. was measured along seven lines in reciprocal space. (M26, M22, Al)

340-M. The Intensity of Emission of Characteristic X-Radiation. C. R. Worthington and S. G. Tomlin. *Physical Society, Proceedings*, v. 69, no. 437 A, May 1956, p. 401-412.

A method for calculating emission intensity from thick targets as a function of the target atomic number, accelerating voltage, and angle of emission was applied to emission from silver, copper, chromium and aluminum. (M22, Ag, Cu, Cr, Al)

341-M. The Phase Sections at 500 and 350° C. of Aluminum-Rich Aluminium-Copper-Lithium Alloys. H. K. Hardy and J. M. Silcock. *Institute of Metals, Journal*, v. 84, July 1956, p. 423-428 + 2 plates.

Phase relationships of three ternary intermetallic compounds. (M24, Al, Cu, Li)

342-M. A Recording Camera for Metallography With Polarized Light. B. R. Butcher and I. A. McDonald. *Institute of Metals, Journal*, v. 84, July 1956, p. 453-454 + 1 plate.

Design and operation of camera. (M21)

343-M. Research on Phase Relationships in Ternary Metal-Metal-Oxygen Systems. *Armour Research Foundation, Illinois Institute of Technology, Progress Report No.* B-090G1, for Wright Air Development Center, Wright-Patterson Air Force Base, Contract No. AF 33(616)-3195, July 1956, 25 p.

Lattice constant composition curves were completed for Fe_3O_4-$FeAl_2O_4$ and rhombohedral Fe_2O_3-Al_2O_3 solid solutions. The existence of the compound $Fe_2O_3.Al_2O_3$ was confirmed, its interplanar spacings are listed, and its low temperature stability boundary was fixed at between 1270 and 1300° C. (M24, Fe, Al)

344-M. Methods of Etching High-Alloy Chromium and Chromium-Nickel Steels for Austenite, Ferrite, Sigma Phase, & Carbide. F. Braumann and G. Pier. *Henry Brutcher, Translation No.* 3763, 15 p. (Abridged from *Archiv für das Eisenhüttenwesen*, v. 26, no. 3, 1955, p. 145-151.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 156-M, 1955. (M21, AY)

345-M. New Etch Spots Leaded Steels. A. E. Gerds and C. W. Melton. *Iron Age*, v. 178, Aug. 30, 1956, p. 86-87.

Using relatively simple reagents, this etching technique lends a consistent identifying color to leaded microconstituents. Essential as a research tool, it may also prove valuable in sorting mixed stock. (M21, S10, ST)

346-M. Orientation Relationships Between Alpha Prime and Beta Phases in a Ti-Ni Alloy. D. H. Polonis and J. Gordon Parr. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 892-893.

Investigates habit planes of the martensitic phase as well as the orientation relationships between martensitic and parent phases. (M26, Ti, Ni)

347-M. Investigation of the Partial Constitution Diagram Ti-$TiAu_3$. Paul Pietrokowsky, Ellis P. Frink and Pol Duwez. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 930-935.

Titanium-gold alloys in the region of composition extending from titanium to $TiAu_3$ studied metallographically. (M24, Ti, Au)

348-M. Dislocations in Plastically Bent Germanium Crystals. F. L. Vogel, Jr., *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 946-949.

Densities and distributions of dislocations in plastically bent germanium crystals before and after annealing. (M26, Ge)

349-M. Microstructure of Iron-Sulfur Alloys. Alfred S. Keh and Lawrence H. Van Vlack. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 950-958.

The effect of heat treatments and of additions of manganese, aluminum, silicon and oxygen upon the distribution of sulphide inclusions in iron. (M27, Fe)

350-M. Beta Phase Parameters in the System Ti-V-Mo. Jack L. Taylor. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 959-961.

As expected from similar crystal structures and favorable atomic size factors, titanium, vanadium and molybdenum are completely soluble in one another above the transformation temperature of titanium. The β phase parameters of the continuous solid solution are shown graphically. Limiting compositions for retained β phase determined. (M24, Ti, V, Mo)

351-M. Beta Chromium. Ernest P. Abrahamson, II, and Nicholas J. Grant. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 975-977.

Investigates the structure of β-chromium with both X-ray back-reflection cameras and spectrometers. (M26, Cr)

352-M. Etch Pits and Dislocations in Zinc Monocrystals. John J. Gilman. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 998-1004.

Technique for producing etch pits at the sites of edge dislocations in zinc monocrystals. (M26, M21, Zn)

353-M. Relative Interfacial Energies of Symmetrical Tilt Grain Boundaries in Silver. K. T. Aust. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 1026-1029.

Experimental details and observations. (M26, Ag)

354-M. A New Etching Reagent for Steel and Cast Iron. B. V. Guellard. *Metallurgia*, v. 54, no. 322, Aug. 1956, p. 93-96, 106.

Sodium bisulphite has proved superior to some of the etchants in everyday use. It can be used to reveal phosphorus-rich areas and chemical segregation at the grain boundaries. (M21, ST, CI)

355-M. Surface Metallography Solves Production Problems, I. How to Select and Prepare a Specimen. A. T. Steer. *Metalworking Production*, v. 100, Aug. 3, 1956, p. 1202-1208.

The surface inward to a depth of 0.0001 to 0.001 in. examined by projection micrography at 2000 magnifications. (To be continued.) (M21)

356-M. A Macro Grain Size Technique for Uranium. H. R. Gardner. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-41343, Feb. 1956, 16 p.

Technique developed for estimation of the grain size of beta heat treated uranium. A more reproducible and meaningful estimate of grain size is obtained than with the existing micro (100X) technique. (M28, U)

357-M. Effect of Chemical Composition on the Properties of Steel. B. R. Nijhawan. *Tisco*, v. 3, July 1956, p. 104-112.

General effects of chemistry on the phase diagram, influence of carbon, manganese, sulphur, silicon and phosphorus, effects of alloying elements, alteration in hardenability by changes in chemical composition. (M24, Q29, ST)

358-M. (Czech.) **Structure and Energy at Grain Boundaries of Metals.** F. Erdmann-Jesnitzer. *Hutnické Listy*, v. 11, no. 7, July 1956, p. 424-433.

Outlines electron theory of mutual action of the matrix and of foreign atoms in the matrix for iron and steel. (M27, M26, Fe, ST)

359-M. (French.) **A Contribution to the Study of the Structure of Copper-Tin-Zinc and Copper-Tin-Phosphorus Alloys.** Pierre Julien le Thomas and Dominique Arnaud. *Fonderie*, no. 126, July 1956, p. 274-282.

A study of the breaking mechanism under simple tension in tin bronzes in relation to their tin or phosphorus content. Determination of grain coarseness of these alloys in relation to the delta phase. Attempts to predict the tension characteristics at any given point in the piece. (M27, Q27, Cu, Sn)

360-M. (French.) **Kinetic Study, by Electronic Diffraction, of Structural Transformations and of Oxidation Processes. Advantages Obtained When Using Various Pressures.** J. J. Trillat. *Revue de Metallurgie*, v. 53, no. 7, July 1956, p. 497-502.

Continuous recording of electron diffraction permits kinetics of many transformations to be studied at various temperatures. (M22, N8, R2)

361-M. (German.) **Intermetallic Phases With α Manganese Structure in Austenitic Chromium-Nickel-Molybdenum Steel with High Titanium Content.** Walter Koch and Christa Ilschner-Gensch. *Archiv für das Eisenhüttenwesen*, v. 27, no. 7, July 1956, p. 453-457.

Separation and analysis of the intermetallic phase. (M26, AY)

362-M. (German.) **Atomic Imperfections in Structure of Crystals.** A. Steinemann. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 22, no. 7, July 1956, p. 226-237.

Atomic three-dimensional imperfections, their effect on diffusion, conductivity and optical properties, their detection. (M26)

363-M. (Italian.) **New Electrolytic Reagents for Stainless Steels Containing σ-Phase.** J. Bertetti. *Metallurgia Italiana*, v. 48, no. 7, July 1956, p. 324-326.

The new electrolytic etchants, ammonium persulphate and sodium bromate, were tested to differentiate the sigma phase in stainless, ferritic or austenitic steels. (M21, SS)

364-M. (Russian.) **Ionization X-Ray Structural Investigation of Bismuth Telluride.** F. I. Vasenin and P. F. Konovalov. *Zhurnal Tekhnicheskoi Fiziki*, v. 26, no. 7, July 1956, p. 1406-1414.

Close correlation between redistribution of relative intensity of interference lines and the inversion of the sign of thermo-electromotive force. Associated with this is the existence of two modifications of bismuth telluride. (M26, P15, Bi, Te)

365-M. (Swedish.) **On the Oxygen Content of Wüstite in Equilibrium With Various Gas Phases.** N. A. Hovgard and P. N. Jensfelt. *Jernkontorets Annaler*, v. 140, no. 7, 1956, p. 467-493.

The systems iron-carbon-oxygen and iron-hydrogen-oxygen studied by the reduction of pure Fe_2O_3 with mixtures of carbon dioxide and carbon monoxide at temperatures of 810, 980 and 1150° C. (M24, Fe)

366-M. Notes on Gold Amalgam Crystals. J. J. Frankel. *Chemical, Metallurgical & Mining Society of South Africa, Journal*, v. 56, July 1956, p. 451-456.

Method of preparation, composition and crystallography. X-ray powder photographs show that all the forms prepared over 20 to 95° C. range consist of polycrystalline aggregates of minute cubic crystals, although the original crystal shapes are retained. (M26, Au)

367-M. The Electrical Properties of Dislocations in Germanium. J. W. Allen. *Journal of Electronics*, v. 1, ser. 1, May 1956, p. 580-588.

The electron energy levels at an edge dislocation will be considerably modified by the presence of a Cottrell impurity atmosphere. (M26, P15, Ge)

368-M. The Strength of Lomer-Cottrell Sessile Dislocations. A. N. Stroh. *Philosophical Magazine*, v. 1, 8th ser., no. 6, June 1956, p. 489-502.

Estimation of the size of the piled-up group of dislocations which the sessile dislocation can withstand under conditions of stress and temperature. (M26)

369-M. Some Properties of Vacancies and Interstitials in Cu_3Au. R. A. Dugdale. *Philosophical Magazine*, v. 1, 8th ser., no. 6, June 1956, p. 537-559.

Activation energies for formation and migration of vacancies, the vacancy ordering mechanism, decay of excess vacancies, behavior of interstitials. (M26, Cu, Au)

370-M. Metallography of Titanium-Stabilized 18-8 Stainless Steel. T. V. Simpkinson. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 29, 1956, 27 p.

The effect of various heat treatments upon the formation and solution of carbides and sigma phase in Type-321 stainless steel studied metallographically. (M27, SS)

371-M. Effect of Sigma Phase on Co-Cr-Mo Base Alloys. Ronald Silverman, William Arbiter and Frank Hodi. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 31, 1956, 21 p.

The density, electrical resistivity, R, hardness, impact strength and stress-to-rupture life of the five alloys studied proved to be related to the amount of sigma phase present. (M27, P10, P15, Q general, Co, SG-h)

372-M. The Influence of Molybdenum on the Phase Relationships of a High Temperature Alloy. H. J. Beattie, Jr., and F. L. VerSnyder. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 35, 1956, 17 p.

A series of six nickel-base alloys of constant base composition with the exception of molybdenum, which was varied from 0 to 11% by weight, studied by correlating the results of light and electron metallography, X-ray and electron diffraction. (M26, N6, Ni, SG-h)

373-M. Constitution Studies on the System Magnesium-Zinc. K. P. Anderko, E. J. Klimek, D. W. Levinson and W. Rostoker. *American Society*

for Metals, Transactions, v. 49, *Preprint No.* 41, 1956, 18 p.

Microscopic and X-ray evidence for the existence of MgZn and Mg_2Zn_3, solidification equilibria, invariant reactions that form the intermediate phases. (M24, Mg, Zn)

374-M. A Constitution Diagram for the Alloy System Titanium-Tin. Paul Pietrokowsky and Ellis P. Frink. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 42, 1956, 26 p.

Titanium-tin binary alloys were studied by metallography, X-ray diffraction, incipient melting and thermal analysis methods. (M24, Ti, Sn)

375-M. Phase Relationships of the Calcium-Lithium System. Milton R. Wolfson. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 44, 1956, 10 p.

The phase diagram was determined by thermal analysis and relative hardness data. (M24, Ca, Li)

376-M. (French.) **The Preparation and Study by Electron Diffraction of Metallic Alloys in Thin Layers.** Pierre Michel. *Annales de Physique,* v. 1, ser. 13, July-Aug. 1956, p. 719-744 + 2 plates.

Structure of deposits obtained by condensation of metallic vapors on various carriers at air temperature. (M22, L25, M26)

377-M. (French.) **Experimental Determination of the Densities of Dislocations in Undeformed Metallic Crystals.** H. Lambot. *Revue Universelle des Mines,* v. 12, no. 99, ser. 9, Aug. 1956, p. 228-232.

Critical review of present methods. Densities obtained from optical measurement of corrosion pits are compared with those obtained by diffraction of X-rays. Both methods are satisfactory. (M26, P10)

378-M. (Hungarian.) **How Does Radiography Aid Metallurgy?** Robert Forbath and Elemer Kalmar. *Kohaszati Lapok,* v. 11, no. 7, July 1956, p. 305-309.

Basics of application of radioactive isotopes. Applications in the literature. Applications planned, such as studies of the wear of furnace linings, the effect of the sulphur content of mazut on steel production and in materials testing. (M23, S13, S19, Q9)

379-M. (Japanese.) **Studies on Ball Bearing Steels. X-Ray Determination of Retained Austenite by Integrated Intensities.** Manabu Ueno, Tesutaro Mitsuhashi and Yutaka Nakano. *Journal of Mechanical Laboratory, (Japan.),* v. 10, no. 4, July 1956, p. 125-131.

Monochromatic cobalt Kα X-rays were obtained by the diffraction of cobalt radiation from a lithium fluoride single crystal and used to determine quantitatively the retained austenite. (M22, N8, ST)

380-M. (Polish.) **Equilibrium States in the Chemical Constitution of Fe-Si-O.** *Hutnik,* v. 23, no. 6, June 1956, p. 233-238.

Components in the liquid state of Fe-Si-O, possible chemical combinations, concentrations of the components at equilibrium. Activity coefficients of the individual components. (M24, N14, P12, Fe, Si)

381-M. (Polish.) **The Determination of the Iron-Carbon System.** *Hutnik,* v. 23, no. 7-8, July-Aug. 1956, p. 270-276.

Körber's method of computing the iron-carbon curve. Newer methods, the tabular method and its application, the solubility of graphite and cementite in iron. (M24, Fe)

N

Transformations and Resulting Structures

387-N. Trace-Element Effects in Some Precipitation-Hardening Aluminium Alloys. H. K. Hardy. *Institute of Metals, Journal,* v. 84, July 1956, p. 429-439.

The response to aging of a range of aluminum-copper, aluminum-copper-lithium, and aluminum-lithium alloys in the absence and presence of 0.1% cadmium was used to determine whether trace-element effects in precipitation reactions are specific to certain precipitates. (N7, Al, Cd, Cu, Li)

388-N. A Consideration of the Changes and Mechanisms Involved During the Annealing of Cold Worked Metals. M. Deighton. *Institute of Metals, Journal,* v. 84; *Institute of Metals Bulletin,* v. 3, July 1956, p. 93-97.

Suggests that recovery is due to interaction of dislocations of opposite sense, that polygonization is a stress-induced process occurring during deformation and that recrystalization in situ is a growth of these subgrains. (N4, N5, Q24, J23)

389-N. On the Dislocation Theory of Evaporation of Crystals. N. Cabrera and M. M. Levine. *Philosophical Magazine,* v. 1, 8th ser., no. 5, May 1956, p. 450-458.

Theory of the steady state spiral, taking account of the strain energy around the dislocation. (N16)

390-N. A Sensitive Technique for Studying Phase Transformations. A. N. Alfimov. *Research,* v. 9, Aug. 1956, p. 302-305. (Translated from the Russian by R. Hardbottle.)

A thermomagnetic apparatus which has been developed for the study of phase changes in steel. (N8, ST)

391-N. The Temperature of Formation of Martensite and Bainite in Low-Alloy Steels; Some Effects of Chemical Composition. W. Steven and A. C. Haynes. *Iron and Steel Institute, Journal,* v. 183, Aug. 1956, p. 349-359.

Empirical formulae were derived relating composition and certain transformation temperatures. (N8, AY)

392-N. The Bainite Transformation. R. E. Hehemann and A. R. Troiano. *Metal Progress,* v. 70, Aug. 1956, p. 97-104.

Published information about this solid-state reaction and the resulting metastable phase has been critically reviewed and assessed in the light of recent findings. (N8, ST)

393-N. Solid Solutions and Grain Boundaries. B. L. Averbach, M. Cohen, M. Hillert, R. Kaplow and A. Schogel. *Massachusetts Institute of Technology Department of Metallurgy (U. S. Atomic Energy Commission),* NYO-7052, Sept. 1955, 3 p.

Report progress in the measurements of short range order and of the so-called Huang effect. (N10, Cu, Pt)

394-N. Fundamentals of Cold Working and Recrystallization. B. L. Averbach and M. Cohen, S. Allen, M. F. Comerford, C. Houska and L. Mager. *Massachusetts Institute of Technology Department of Metallurgy (U. S. Atomic Energy Commission),* NYO-7077, Sept. 1955, 3 p.

Short-range order as a function of annealing temperature; structure of bent and annealed zinc crystals; imperfections and the martensitic transformation in CoNi Alloys; recovery and recrystallization in α brass. (N5, N9, Cu, Ni, Co, Zn)

395-N. Effect of Temperature of Liquid Steel Upon Ingot Structure. A. P. Pronov. *Henry Brutcher, Translation No.* 3776, 8 p. (From *Izvestiya Akademii Nauk SSSR, OTN,* no. 4, 1955, p. 58-62.) Henry Brutcher, Altadena, Calif.

Structure of ingot interior as affected by ingot dimensions and temperature of sinkhead metal is shown by a longitudinal section through a five-ton steel ingot. (N12, D9, AY)

396-N. Effect of Stress Upon the Aging of a Ternary Nickel, 20% Cr, 2.5% Ti Alloy. V. A. Parfenov. *Henry Brutcher, Translation No.* 3734, 6 p. (From *Metallovedenie i Obrabotka Metallov,* v. 1, no. 4, 1955, p. 16-19.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original See item 85-N, 1956. (N7, M27, Q25, Ti, Cr, Ni)

397-N. (English.) **Dendrites and Growth Layers in the Electrocrystallization of Metals.** Gösta Wranglén. *Acta Polytechnica Chemistry Including Metallurgy Series),* v. 4, no. 11, 1955, 41 p.

Electrodeposited dendrites show a simple relation to the space lattice. Metals of low overvoltage grow by the lateral extension of layers, about 1 μ thick. Inhibition increases the thickness and number of growth layers but decreases their rate of flow. (N12, L17, Sn, Pb, Ag, Cu, Cd)

398-N. (Russian.) **Structural Features of Ni-Al Alloys in the Decomposition Process of a Supersaturated Solid Solution of Aluminum in Nickel.** Iu. A. Bazariatskii and Ire. D. Tiapkin. *Doklady Akademii Nauk SSSR,* v. 108, no. 3, May 21, 1956, p. 451-454 + 1 plate.

X-ray study of aging of annealed aluminum alloys with a high nickel content. Structural heterogeneity of monophase solid solutions. (N7, Ni, Al)

399-N. (Russian.) **Crystallization of Liquid Steel Under Pressure.** P. N. Bidulia, I. I. Bobrov and K. N. Simirnova. *Liteinoe Proizvodstvo,* 1956, no. 7, June 1956, p. 1-4.

Equipment and methods. Advantages in comparison with ordinary cast and rolled steels. (N12, CI, ST)

400-N. (Russian.) **Formation of Pearlite in Ferritic Ductile Cast Iron.** K. I. Vashchenko and N. A. Golovan. *Liteinoe Proizvodstvo,* 1956, no. 7, June 1956, p. 14-18.

Pearlite formation is conditioned by phosphides concentrated at the boundary between the decarburized zone and the base metal. (N8, CI)

401-N. The Solid Solubility of Uranium in Thorium and the Allotropic Transformation of Thorium-Uranium Alloys. Wendell B. Wilson, Alfred E. Austin and Charles M. Schwartz. *Battelle Memorial Institute (U. S. Atomic Energy Commission),* BMI-1111, July 1956, 12 p.

Determination of the transition temperature, effect of uranium on the transition temperature, solubility of uranium in thorium as a function of temperature. (N12, N6, U, Th)

402-N. Internal Friction and Grain Boundary Viscosity of Copper and of Binary Copper Solid Solutions. L. Rotherham and S. Pearson. *Journal of Metals,* v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 206, sec. 2, Aug. 1956, p. 881-892.

Measurements were made of the variation of internal friction with temperature for OFHC copper, and for a series of binary solid solutions of high-purity copper with zinc, gallium, germanium, arsenic and silicon, to investigate the effect of alloying elements in substitutional solid solution on grain boundary viscosity. (N1, Q22, Cu)

403-N. Internal Friction and Grain Boundary Viscosity of Silver and Binary Silver Solid Solutions. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 894-901.

Measurements were made of the variation of internal friction with temperature for spectroscopically pure silver, and for a series of solid solutions of silver with cadmium, indium and tin, using a Ke-type torsion pendulum apparatus. (N1, Q22, Ag)

404-N. Self-Diffusion in Magnesium Single Crystals. P. G. Shewmon. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 918-922.

Radioactive Mg^{28} was used to study the rate of self-diffusion in oriented single crystals of magnesium in the temperature range 468 to 635° C. (N1, Mg)

405-N. Recrystallization of Zone-Melted Aluminum. A. W. Demmler, Jr. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 958-959. (N5, Al)

406-N. Microstructural Differences in Tempered Titanium Alloys. L. D. Jaffee. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 961-962. (N6, J29, Ti)

407-N. Effect of the Annealing Temperature on the Formation of the Cube Texture. Alfonso Merlini. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 967-972.

By a suitable choice of the penultimate grain size and rolling reduction, an OFHC copper strip was produced which has a low temperature (315° C.) annealing texture containing, in addition to the cube texture component, four components similar to those of the deformation texture. (N6, J23)

408-N. Solidification of Aluminum-Zinc Alloys. Donald Jaffe and Michael B. Bever. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 972-975.

Solidification of aluminum-zinc alloys (2 to 70% Zn) was investigated at different rates of solidification. Resulting structures were studied, and amounts of nonequilibrium eutectic were measured and compared with amounts calculated on the assumption of no diffusion in the solid. Compositions of the cored primary constituent were investigated by quantitative autoradiography after activation of the zinc by neutron irradiation. These compositions were also determined from microhardness values. (N12, Al, Zn)

409-N. Characteristics of the Bainite Transformation in a Ni-Cr Steel. L. S. Birks. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 989-993.

Material and specimen preparation; X-ray techniques. (N8, AY)

410-N. Growth of Graphite in Cast Iron. C. E. Birchenall and H. W. Mead. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 1004-1008.

The rates of growth of graphite nodules in cast iron are calculated for a model of a growing graphite sphere surrounded by a shell of austenite through which carbon and iron are diffusing. (N8, CI)

411-N. Primary Recrystallization Textures in Cold Rolled Si-Fe Crystals. C. G. Gunn and P. K. Koh. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 1017-1024.

Recrystallization behavior of 11 crystals after cold rolling reductions of 70%. (N5, Q24, Fe-q)

412-N. Martensitic Transformation in Binary Titanium Alloys. Y. C. Liu. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 1036-1040.

Investigation was made to determine whether other binary titanium alloys with β-stabilizing elements would exhibit a crystallography of transformation similar to that of Ti-Mn alloys. (N9, Ti)

413-N. On the Ordering Behavior of CuAu. C. J. Meechan and C. E. Dixon. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1531, July 1956, 18 p.

The effects of disordering temperature, cold work and electron irradiation on the ordering rate of CuAu at 150 and 22° C. were measured. The ordering rate is increased by rapid quenching from above the critical temperature, cold working disordered samples, and irradiating disordered samples with 1 mev. electrons. (N10, Cu, Au)

414-N. The Diffusion of Helium in Thorium and Uranium. Alan Andrew, Clifton R. Davidson and Lyle E. Glasgow. *North American Aviation, Inc. (U. S. Atomic Energy Commisssion)*, NAA-SR-1598, July 1956, 18 p.

Thorium and uranium foils were impregnated with alpha particles from the 60-in. Berkeley cyclotron. Subsequent heating showed that under 1040° C. no helium diffuses out of uranium. Helium was observed to diffuse out of thorium. (N1, Th, U)

415-N. (Czech.) **Isothermal Decomposition of Austenite in Tungsten Alloyed Steels. II. The Influence of Tungsten on the Isothermal Decomposition of Austenite in 35Cr2V Steel.** Josef Cadek. *Hutnické Listy*, v. 11, no. 7, July 1956, p. 409-419.

Thermomagnetic, metallographic, X-ray and microchemical analysis of the electrochemically isolated carbide phase in the decomposition products. (N8, AY)

416-N. (French.) **Some Effects of Heat Treatment and Microstructure on the Transition Temperature of a 0.24% Carbon Steel.** G. Burns and C. Judge. *Revue de Métallurgie*, v. 53, no. 7, July 1956, p. 510-521.

Austenite grain size at the beginning of cooling is shown to be a major factor affecting the transition temperature. Cooling rate also has a substantial effect. (N8, CN)

417-N. (German.) **Annealing Processes in Martensite.** Werner Jellinghaus. *Archiv für das Eisenhüttenwesen*, v. 27, no. 7, July 1956, p. 433-488.

Investigation of three unalloyed steels with 0.2, 0.4, and 0.8% of carbon by means of measuring magnetization, electrical resistance, coercivity power and change in volume. (N8, J23, CN)

418-N. (German.) **Austenite Formation of Sub-Eutectoid Steels in Graphs of Time-Temperature-Solution.** Adolf Rose and Werner Strassburg. *Stahl und Eisen*. v. 76, no. 15, July 26, 1956, p. 976-983.

Investigation of steels with 0.45%, 0.70%, 0.30% carbon, 1.1% chromium and 0.18% molybdenum. Effects of composition on pearlite and ferrite precipitation, effect of structural conditions. (N8, ST)

419-N. (Russian.) **A Study of the Annealing Process in the Iron-Nitrogen System.** V. G. Permiakov. *Metallovedenie i Obrabotka Metallov*, no. 7, July 1956, p. 2-9.

A study of the structure of commercial iron tempered after various degrees of nitriding and changes occurring during heating. Tests made on iron with 0.02% carbon content. (N8, J23, J28, Fe)

420-N. (Russian.) **Transformation of Residual Austenite—Basic Cause of Deformation in Welded Structures.** A. V. Mordvintseva. *Metallovedenie i Obrabotka Metallov*, no. 7, July 1956, p. 48-54.

A study of causes of the deformation of welded structures at room temperature. Basic cause is the transformation of residual austenite. Most low-alloy steels undergo some deformation after welding. (N8, Q24, AY)

421-N. Correlation Effects in Diffusion in Crystals. A. D. Le Claire and A. B. Lidiard. *Philosophical Magazine*, v. 1, 8th ser., no. 6, June 1956, p. 518-527.

A simplified account of the random walk method of dealing with correlation effects in atomic diffusion in crystals. General formulae for the diffusion coefficient which take account of this correlation. (N1)

422-N. Solute Diffusion in Metals. L. C. R. Alfred and N. H. March. *Physical Review*, v. 103, ser. 2, Aug. 15, 1956, p. 877-878.

Use of more accurate fields around the solute atoms is shown to decrease very appreciably the descrepancy found by Blatt between theoretical and experimental values of activation energies for solute diffusion in silver. (N1, Ag)

423-N. Relationship Between Heat Treatment, Structure, and Mechanical Properties of a Titanium Alloy Containing 4% Cr and 2% Mo. A. W. Goldenstein and W. Rostoker. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 13, 1956. 14 p.

Time - temperature - transformation characteristics, relationships between mechanical properties and heat treatment, influence of alpha platelet size on tensile properties, influence of original beta grain size on mechanical properties. (N6, Q general, J general, Ti)

424-N. On the Cooling Transformations in Some 0.40% Carbon Constructional Alloys Steels. D. J. Blickwede and R. C. Hess. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 17, 1956, 21 p.

Cooling transformation diagrams were determined by metallographic observations of interrupted end-quench bars. (N8, AY)

425-N. Transformation Kinetics of Uranium-Niobium and Ternary Uranium-Molybdenum-Base Alloys. R. J. Van Thyne and D. J. McPherson. *American Society for Metals, Transac-*

tions, v. 49, *Preprint No.* 19, 1956, 26 p.

Metallographic resistometric, X-ray diffraction and hardness techniques were employed to investigate transformation. (N6, U, Cb, Mo)

426-N. Transformation Kinetics of Uranium-Molybdenum Alloys. R. J. Van Thyne and D. J. McPherson. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 20, 1956, 30 p.

Metallographic, room temperature electrical resistometric, X-ray diffraction spectrometer and hardness techniques were employed to study the stability of the gamma phase which can be retained to room temperature by water quenching. (N6, U, Mo)

427-N. Precipitation Reactions in Austenite Cr-Mn-C-N Stainless Steels. Chi-Mei Hsiao and E. J. Dulis. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 26, 1956, 30 p.

Both the grain boundary reaction and the general precipitation reaction increase hardness of the steel. The former occurs by a nucleation and growth process. (N7, SS)

428-N. Martensitic Transformation in the Machining of Austenitic Stainless Steel. E. F. Erbin, E. R. Marshall and W. A. Backofen. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 27, 1956, 21 p.

Planing and grinding of Types 301 and 304 austenitic stainless steel cause transformation of austenite to martensite. Extent of the transformation was determined quantitatively with an X-ray diffraction technique and related to the stresses, strains, and cutting energies. (N8, G17, SS)

429-N. Transformation Products in Cold-Worked Austenitic Manganese Steel. R. K. Buhr, S. L. Gertsman and James Reekie. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 28, 1956, 13 p.

Small amounts of a ferromagnetic transformation product are formed when the steel is work hardened by impact. This constituent is concentrated along the traces of slip planes and at grain boundaries and is probably tempered martensite. (N8, N7, AY)

430-N. Phase Relationships and Mechanical Properties of Some Iron-Chromium-Carbon-Nitrogen Alloys. G. F. Tisinai and C. H. Samans. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 30, 1956, 15 p.

Tensile tests at room and elevated temperatures showed that the austenitized alloys had much higher strengths than the austenitic iron-chromium-nickel steels but still had excellent ductilities. (N8, Q general, Fe, Cr)

431-N. Aging Reactions in Certain Super Alloys. W. C. Hagel and H. J. Beattie, Jr. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 40, 1956, 26 p.

Changes in the properties and structures of N-155, G-18B and 15-15N alloys were determined as a function of solutioning at 1800 to 2200° F. and aging at 1200 to 1600° F. for times up to 1000 hr. (N7, SG-h)

432-N. The Tempering of Iron-Carbon Martensite Crystals. F. E. Werner. B. L. Averbach and Morris Cohen. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 43, 1956, 20 p.

A single-crystal X-ray study of the matrix of quenched and tempered iron-carbon and iron-carbon-nickel alloys. (N8, J29, CN)

433-N. (German.) **Kinetics of Austenite Formation of Alloyed and Low-Alloyed Sub-Eutectoid Steels.** Adolf Rose and Werner Strassburg. *Archiv für das Eisenhüttenwesen*, v. 27, no. 8, Aug. 1956, p. 513-520.

Study of austenite formation through nucleation and growth in steels with 0.45% carbon, 0.70% carbon, and 0.30% carbon, 1.1% chromium, and 0.18% molybdenum according to photo and electronic-optical structural pictures. (N8, AY)

434-N. (German.) **New Investigations and Conceptions in the Field of Recrystallization Research.** W. G. Burgers. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 101, no. 7, July 1956, p. 151-154.

Difference between recovery and recrystallization. Nucleus formation during recrystallization. "Polygonization" phenomenon. (N5)

435-N. (Polish.) **The Effect of Stable Carbide-Forming Elements on the Isothermal Transformation of Supercooled Austenite.** H. Matyja. *Hutnik*, v. 23, no. 7-8, July-Aug. 1956, p. 285-290.

Applying the crystallization theory to the process of isothermal transformation of austenite. How the alloying elements effect the process. Details of test of isothermal transformation made on two Cr-Ni-Ti steels. (N8, AY)

P

Physical Properties and Test Methods

403-P. The Determination of Thermal Diffusivity of Aluminum Alloys at Various Temperatures by Means of a Moving Heat Source. Daniel Rosenthal and N. E. Friedmann. *ASME Transactions*, v. 78, Aug. 1956, p. 1175-1180.

Results on alloys 35 and 61S proved that values of thermal diffusivity, averaged over an interval of 100° F., can be determined easily to three significant figures. (P11, Al)

404-P. (English.) **Physico-Chemical Researches on Copper Metallurgy. IV. Activity of Sulphur in Molten Copper.** Keinosuke Hirakoso and Tokiaki Tanaka. *Hokkaido University, Faculty of Engineering, Memoirs*, v. 9, Nov. 1954, p. 565-573.

Equilibrium for the system containing hydrogen, copper-saturated molten cuprous sulfide, and sulphur-saturated liquid copper was determined from 1145 to 1247° C. by the flow method. (P12, C21, Cu)

405-P. The Dissociation Pressures in the Zirconium-Oxygen System at 1000° C. O. Kubaschewski and W. A. Dench. *Institute of Metals, Journal*, v. 84, July 1956, p. 440-444.

Alloys of various compositions were equilibrated with calcium, magnesium or barium in bombs of zirconium or steel at 1000° C. After leaching, the compositions of the products were determined by chemical and vacuum-fusion analyses. (P12, S11, Zr)

406-P. The Enthalpy of Pure Iron. J. R. Pattison and P. W. Willows. *Iron and Steel Institute, Journal*, v. 183, Aug. 1956, p. 390-403.

An apparatus for the direct measurement of the enthalpy of metals at high temperatures by the method of mixtures using a water calorimeter. Some smoothed values of enthalpy for the temperature range of 1000 to 1650° C. (P12, Fe)

407-P. Thermal Changes in Steels as Shown by Resistivity. G. Bullock. *Iron and Steel Institute, Journal*, v. 183, Aug. 1956, p. 362-367.

The development of a method for determining precise apparent electrical resistivity values at high temperatures so that the results may be plotted in a manner analogous to inverse-rate thetrmal curves. (P11, P15, ST)

408-P. Saturation Moments and d-Band Configurations in Iron and Its Alloys. B. R. Coles and W. R. Bitler. *Philosophical Magazine*, v. 1, 8th ser., no. 5, May 1956, p. 477-486.

The saturation moments of some iron-cobalt-aluminum alloys were measured and the effect of aluminum on the moments of iron-cobalt alloys compared with its effect on the moment of pure iron. (P16, Fe)

409-P. Magnetization Curves and Domain Structure. L. F. Bates and A. Hart. *Physical Society, Proceedings*, v. 69, no. 437 B, May 1956, p. 497-505.

A study of the changes in domain patterns on the two main faces of a Néel-cut crystal of silicon iron, occurring when the crystal dimensions are changed. (P16, Fe)

410-P. Chemical and Radiochemical Studies of Tellurium in Fluoride Volatility Processes. J. Fischer and R. K. Steunenberg. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5593, June 1956, 19 p.

The chemical nature of various gas and liquid phase mixtures of tellurium hexafluoride with bromine trifluoride, bromine pentafluoride and bromine. Radiochemical observations on the partial reduction of tellurium hexafluoride and the separation of daughter isomers due to the internal conversion of gamma rays of Te^{127m} and Te^{129m}. (P13, Te)

411-P. Some Thermal Properties of Solid Materials. I. Metals. M. E. Lapides and R. C. Brubaker. *General Electric Company, Aircraft Nuclear Propulsion Department (U. S. Atomic Energy Commission)*, APEX-244, Sept. 1955, 65 p.

A review of the theoretical background of some thermal properties. Data for thermal conductivity, specific heat, density, emissivity, melting points and thermal expansion coefficients of nine metals. (P10, P11, P12, P17)

412-P. Solid-Liquid Equilibrium in the Lithium-Lithium Hydride System. I. Apparatus; Melting and Freezing Points of Lithium Hydride and Lithium Hydride-Rich Mixtures. Charles E. Messer, Edwin B. Damon and P. C. Maybury. *Tufts University, (U. S. Atomic Energy Commission)*, NYO-3958, Dec. 1955, 16 p.

A thermal analysis under conditions of carefully controlled heating and cooling rates. Hydrogen pressures and changes in composition by hydrogen gain or loss were studied. (P12, Li)

413-P. Solubility of Hydrogen in Liquid Aluminum, Lead, and Zinc. W. Hofmann and J. Maatsch. *Henry Brutcher, Translation No* 3752, 15 p. (From *Zeitschrift Metallkunde*. v. 47, no. 2, 1956, p. 89-94.) Henry Brutcher, Altadena, Calif.

Procedure and apparatus for solubility measurements, purification of

gas, constancy of temperature, measurement of pressure and volume. (P13, Al, Pb, Zn)

414-P. (Russian.) **Thermo-Electrical Properties of Cr Sb_2.** N. Kh. Abrikosov and V. F. Bankina. *Doklady Akademii Nauk SSSR*, v. 108, no. 4, June 1, 1956, p. 627-628.

Experimental results are given in tables and graphs. (P15, Cr, Sb)

415-P. (Russian.) **Thermo-Electric Properties of Bismuth.** G. A. Ivanov and L. I. Mokieveskii. *Zhurnal Tekhnicheskoi Fiziki*, v. 26, no. 6, June 1956, p. 1343-1344.

Correction of previous statements as to relation between thermo-electromotive force and temperature differences at specimen ends. (P15, Bi)

416-P. The Equilibrium of α-Silver-Cadmium Alloys With Cadmium Vapor. George Scatchard and Richard. H. Boyd. *American Chemical Society, Journal*, v. 78, Aug. 20, 1956, p. 3889-3893.

An electronic spectrophotometer for measuring the concentration of metal vapor in equilibrium with a solid or liquid alloy. A comparison of the behavior of three α-alloys: copper-zinc, silver-zinc, silver-cadmium. (P12, Ag, Cu, Cd, Zn)

417-P. Activity Coefficient of Copper in Liquid Iron at 1600° C. Frederick C. Langenberg. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 1024-1025.

Experimental determination. (P12, Cu, Fe)

418-P. Vapor Pressure of Liquid Copper and Activities in Liquid Fe-Cu Alloys. J. P. Morris and Glenn R. Zellars. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 1, Aug. 1956, p. 1086-1090.

Carrier gas method was used to measure the vapor pressure of copper over liquid copper and Fe-Cu alloys. (P12, Fe, Cu)

419-P. Predicting the Solubility of Nitrogen in Molten Steel. Frederick C. Langenberg. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 1, Aug. 1956, p. 1099-1101.

A method is presented for computing the solubility of nitrogen in molten alloy steels. Examples are given to illustrate the procedure; comparisons are made between predicted and measured nitrogen solubilities. (P13, N12, AY)

420-P. Activity Coefficient of Copper in Liquid Iron, Fe-C, and Fe-C-Si Alloys at 1600° C. Peter J. Koros and John Chipman. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 1, Aug. 1956, p. 1102-1104.

Distribution of copper between liquid silver and liquid iron, Fe-C, and Fe-C-Si alloys was studied at 1600° C. (P12, Cu, Fe)

421-P. The Evolution of the Energy Stored by a Gold-Silver Alloy Cold Worked at −195° C. and at Room Temperature. Peter Greenfield and M. B. Bever. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission)*, AECU-3124, 1955, 17 p.

Energy stored was measured by tin solution calorimetry. Effect of annealing upon the energy content retained by samples deformed at these temperatures; results discussed in terms of the types of lattice imperfections produced by cold working. (P12, Ag, Au)

422-P. Magnetic Measurements. C. E. Webb. *Metallurgia*, v. 54, no. 322, Aug. 1956, p. 57-66.

Basic principles of the chief methods of determining the properties of ferromagnetic materials. Special consideration is given to the testing of permanent magnets by standard and comparative methods, and to the conditions necessary to insure that test results give reliable indications of practical performance. (P16)

423-P. Magnetic Properties of Steels. R. V. Tamhankar. *Tisco*, v. 3, July 1956, p. 95-103.

Magnetic phenomenon and the domain theory, soft, hard, and nonmagnetic steels; magnetic analysis; applications in nondestructive testing. (P16, S13, ST)

424-P. (English.) **Pictorial Kinetic Methods in the Theory of Metals and Semiconductors.** R. B. Dingle. *Physica*, v. 22, no. 8, Aug. 1956, p. 671-680.

This pictorial method gives correct results when the collision time is independent of the electron speed. (P15)

425-P. (French.) **Magnetic, Antiferromagnetic and Ferromagnetic Properties of $MnAu_2$.** André J. P. Meyer and Pierre Taglang. *Journal de Physique et le Radium*, v. 17, no. 6, June 1956, p. 457-465.

$MnAu_2$ is antiferromagnetic in fields below 10,000 oersteds below 90° C., ferromagnetic when the field increases above a certain threshold, and paramagnetic above 90° C. A recent theory by L. Neel correctly interprets the experimental facts. (P16, Au, Mn)

426-P. (German.) **Effect of Electromagnetic Irradiation and Corpuscular Radiation on the Properties of Solid Bodies.** Paul Höller. *Archiv für das Eisenhüttenwesen*, v. 27, no. 7, July 1956, p. 459-468.

Review of literature on the subject, with particular reference to metals. (P general)

427-P. (German.) **Shrinkage Behavior of Cast Iron.** A. Wittmoser, H. A. Krall and L. Hütter. *Giesserei*, v. 43, no. 16, Aug. 2, 1956, p. 409-418.

Study of tendency of various cast irons to form pipe cavities and other shrinkage defects. (P10, E25, CI)

428-P. (Italian.) **Thermodynamic Researches on Metallic Systems. VIII. The Ternary Liquid System Zn-Cd-Sb.** Mario Fiorani, Venanzio Valenti and Luigi Oleari. *Gazzetta Chimica Italiana*, v. 86, nos. 8-9, Aug.-Sept. 1956, p. 624-630.

Integral molar thermodynamic values of the Zn-Cd-Sb system in liquid state. (P12, Zn, Cd, Sb)

429-P. Magnetizing and Demagnetizing Permanent Magnets. R. J. Parker. *Electrical Manufacturing*, v, 58, Sept. 1956, p. 116-123.

The mechanics of magnetization have a decided design influence. Some practical techniques are presented. (P16, SG-n)

430-P. The Cohesive Energies of Transition Metals. J. Stanley Griffith. *Journal of Inorganic and Nuclear Chemistry*, v. 3, Aug. 1956, p. 15-23.

An approximate theory of cohesive energies of first transition-series metals. (P12, Q23)

431-P. Density Changes During the Annealing of Deformed Nickel. L. M. Clarebrough, M. E. Hargreaves and G. W. West. *Philosophical Magazine*, v. 1, 8th ser., no. 6, June 1956, p. 528-536.

Changes were measured by a differential method and are correlated with earlier measurements of stored energy, electrical resistivity and hardness. (P10, J23, Ni)

432-P. Some Properties of the Coercive Force in Soft Magnetic Materials. D. S. Rodbell and C. P. Bean. *Physical Review*, v. 103, ser. 2, Aug. 15, 1956, p. 886-895.

Coercive force was measured in specimens of magnetically annealed 65 Permalloy tapes and a 3.25% SiFe picture frame single crystal for both low and high-field domain configurations. (P16, Ni, Fe)

433-P. (German.) **Thermodynamic Analysis. IV. Mixing Entropy and Formation Activity of Lead-Cadmium Smelting From Calorimetric Measurements.** Willy Oelsen, Eberhard Schürmann, Hans-Joachim Weigs and Olaf Oelsen. *Archiv für das Eisenhüttenwesen*, v. 27, no. 8, Aug. 1956, p. 487-511.

Determination of mixing heat, activity and entropy of lead-cadmium alloy formation from continuously recorded heat absorption curves. (P12, Pb, Cd)

434-P. (German.) **Functional Relationship of Temperature of Molar Volumes of the Phases NaTl and LiCd.** A. Schneider and G. Heymer. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 286, no. 3-4, July 1956, p. 118-135.

Radiographic determination of lattice constants between room temperature and melting point is applied to lead, antimony, thallium, cadmium and indium. Results are compared with the temperature dependence of densities of NaTl and LiCd in solid and liquid states. Various factors determining the stability of the NaTl lattice are presented. (P10, M26, Na, Li, Pb, Sb, Tl, Cd, Zn)

435-P. (Book) **Metal Physics and Physical Metallurgy. v. III. Thermochemical Data of Alloys.** O. Kubaschewski and J. A. Catterall. 200 p. 1956. Pergamon Press, 122 E. 55th St., New York, N. Y.

The partial and integral heats, entropies, and free energies were assessed for about 230 binary and ternary systems. (P12)

Q

Mechanical Properties and Test Methods; Deformation

769-Q. An Impact Test for Use With Cermets. Edwin J. Soxman, James R. Tinklepaugh, and Martin T. Curran. *American Ceramic Society, Journal*, v. 39, Aug. 1956, p. 261-265.

Advantages, limitations and possible use of the Charpy drop test. (Q6, C-n)

770-Q. Analysis of the Stresses in a Cutting Edge. F. R. Archibald. *ASME Transactions*, v. 78, Aug. 1956, p. 1149-1154.

Equations for the stress components at any point of the tool tip. (Q25, G17)

771-Q. The Stress-Hardness Relation. Aram Dervishyan. *ASTM Bulletin*, 1956, no. 215, July, p. 71-75.

Theoretical considerations and experimental results showing that stress and hardness have a linear relationship. Potential applications. (Q29, Q25)

772-Q. Conditions of Failure in Some Turbine Diaphragm Blades. K. H. Khalil. *Engineer*, v. 202, July 20, 1956, p. 78-80.

Failure appeared to be due to the change in pressure at both faces of the aerofoil blade, being comparatively positive at the concave

and negative at the convex side with respect to the ambient pressure in the stage. A vortex wake is thus formed downstream initiating vibration of the blade edge. (Q26)

773-Q. Influence of Rate of Solidification on the Mechanical Properties of Cu-Sn-Zn and Cu-Sn-P Alloys. P. J. Le Thomas and D. Arnaud. *Foundry Trade Journal*, v. 101, July 12, 1956, p. 51-57.

Tensile tests were accompanied by macrographic and micrographic examination. (Q23, N12, Sn, Zn, Cu)

774-Q. How Carbon Content Affects Impact Properties. H. Schwartzbart and J. P. Sheehan. *Iron Age*, v. 178, Aug. 9, 1956, p. 85-89.

Properties of eight common structural alloy steels examined at various carbon levels. No one grade is superior at all carbon and hardness levels. (Q6, Q23, CN)

775-Q. How Boron, Grain Size Affect Impact Properties. II. H. Schwartzbart and J. P. Sheehan. *Iron Age*, v. 178, Aug. 16, 1956, p. 102-106.

Both have important effects on the impact strength of low alloy steels, along with carbon and alloy content. (To be continued.) (Q6, M27, AY)

776-Q. X-Ray Studies of Stresses in Metals. *National Bureau of Standards, Technical News Bulletin*, v. 40, Aug. 1956, p. 105-107.

Suggests new explanation of residual strain balancing. (Q25, N22)

777-Q. The Creep of Cadmium Crystals at Liquid Hellum Temperatures. J. W. Glen. *Philosophical Magazine*, v. 1, 8th ser., no. 5, May 1956, p. 400-408.

Suggests that creep is due to the quantum mechanical tunnel effect, which allows dislocations to penetrate barriers to their motion that cannot be overcome by the action of the applied stress alone. (Q3, Cd)

778-Q. The Internal Friction of Cold Worked Copper at Low Temperatures. D. H. Niblett and J. Wilks. *Philosophical Magazine*, v. 1, 8th ser., no. 5, May 1956, p. 415-418.

Measurements were made on bars of copper which were first annealed in argon for one hour at 600° C. and then plastically deformed in a tensiometer. (Q22, Cu)

779-Q. A Study of Lubrication in Relation to Continuous Metal-Deformation Processes. L. H. Butler. *Sheet Metal Industries*, v. 33, no. 352, Aug. 1956, p. 571-577.

Reviews and relates existing knowledge of friction and lubrication through the specific case of bulk metal flow and quotes the results of some experimental work. (To be continued.) (Q9, Q24)

780-Q. Damage to Metals During Prolonged Loading at Elevated Temperatures. Ya. B. Fridman and B. A. Drozdovskii. *Henry Brutcher, Translation No.* 3504, 6 p. (From *Doklady Akademii Nauk SSSR*, v. 95, no. 4, 1954, p. 793-796.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 588-Q, 1954. (Q general, Cr, Ni)

781-Q. Behavior of Graphite Nodules in the Plastic Deformation of Ductile Iron. B. Sigg. *Henry Brutcher, Translation No.* 3726, 4 p. (Translated from *Schweizer Archiv*, v. 21, no. 5, 1955, p. 148-150.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 669-Q, 1955. (Q24, CI)

782-Q. Effect of Deoxidation With Aluminum Upon the Irreversible Temper Brittleness of Structural Alloy Steels. E. N. Sokolkov, G. V. Gaidukov and V. D. Sadovskii. *Henry Brutcher, Translation No.* 3743, 4 p. (From *Fizika Metallov i Metallovedenie*, v. 1, no. 2, 1955, p. 366-367.) Henry Brutcher, Altadena, Calif.

Evidence points to grain refinement induced by aluminum additions as the principal factor in reducing the incidence of temper brittleness in steel. (Q23, Al, AY)

783-Q. Iron-Copper-Graphite Porous Antifriction Alloys. V. E. Mikryukov and N. Z. Pozdnyak. *Henry Brutcher, Translation No.* 3746, 11 p. (Abridged from *Vestnik Mashinostroeniya*, v. 36, no. 2, 1956, p. 52-56.) Henry Brutcher, Altadena, Calif.

Mechanical properties and structural homogeneity of compacts as function of copper content; results of tests for coefficient of friction and rate of wear. (Q9, H15, Fe, Cu)

784-Q. Composition-High Temperature Strength Diagram for Nickel-Tungsten System. I. I. Kornilov and P. B. Budberg. *Henry Brutcher, Translation No.* 3747, 6 p. (From *Doklady Akademii Nauk, SSSR*, v. 100, no. 1, 1955, p. 73-75.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 389-Q, 1955. (Q3, Q23, Ni, W)

785-Q. Influence of the Ratio of Areas of Friction Upon Wear. D. N. Garkunov. *Henry Brutcher, Translation No.* 3764, 4 p. (From *Doklady Akademii Nauk SSSR*, v. 104, no. 2, 1955, p. 227-228.) Henry Brutcher, Altadena, Calif.

Relationship between ratio of gravimetric wear of two materials (like with like and with unlike) in frictional contact, and ratio of their surface areas of friction. (Q9)

786-Q. (German.) **Effects of Small Chromium and Nickel Contents on the Properties of Steel Products.** Alexander Schepers and Richard Krauss. *Stahl und Eisen*, v. 76, no. 14, July 12, 1956, p. 896-903.

Effects on mechanical and technological properties. (Q general, ST)

787-Q. (German.) **Problem of Brittleness.** Eduard Houdremont and Heinrich Mussmann. *Stahl und Eisen*, v. 76, no. 14, July 12, 1956, p. 903-907.

Transformation processes and temperatures. Significance of the energy released during the breaking process. (Q23, N8, ST)

788-Q. (Russian.) **Preventing a High Degree of Brittleness of Hot Rolled Transformer Steel.** V. A. Koroleva and M. I. Sherstiuk. *Stal'*, v. 16, no. 6, June 1956, p. 545-548.

Possible effect on brittleness of high silicon content, hydrogen absorption during etching and grain growth and the deposition along grain boundaries of a brittle component such as structurally free cementite. The last is the most important factor and can be eliminated by repeated annealing under vacuum at 800 to 900° C. (Q23, N8, J23, SG-p)

789-Q. (Russian.) **Effect of Arsenic on Impact Toughness of Rail Steel.** L. M. Shkol'nik. *Stal'*, v. 16, no. 6, 1956, p. 548-553.

Relation of phosphorus and arsenic contents and temperature to notch toughness and brittleness. Effect of other elements such as carbon and manganese. (Q23, Q6, ST)

790-Q. (Russian.) **Plastic After Effect in Metals.** D. M. Vasil'ev and L. S. Evlashin. *Zhurnal Tekhnicheskoi Fiziki*, v. 26, no. 6, June 1956, p. 1351-1356.

Observations of the residual change in dimensions of specimens when heated after previous plastic deformation by bending or twisting. Contrast between types of after effect in unalloyed carbon steel and alloy steel. (Q25, Q23, P10, CN, AY)

791-Q. (Russian.) **Nature of After Effect in Metals.** D. M. Vasil'ev. *Zhurnal Tekhnicheskoi Fiziki*, v. 26, no. 6, June 1956, p. 1357-1365.

Relation of length of time of relaxation of plastically deformed specimens to temperature and rate of heating. Analysis of dimensional changes taking place during after effect leads to the concept of the existence of oriented microstresses. (Q25, Q23, P10, ST)

792-Q. How Fracture Type, Specimen Size Affect Impact Properties. III. H. Schwartzbart and J. P. Sheehan. *Iron Age*, v. 178, Aug. 23, 1956, p. 107-110.

In martensitic structures, both ductile and brittle fractures are traced to tempering temperature. Effect of specimen size is generally more pronounced at higher hardnesses. (Q26, Q6, AY)

793-Q. How to Control Weld Distortion Within Close Limits. John Mikulak. *Iron Age*, v. 178, Aug. 30, 1956, p. 88-90.

Weld distortion controlled within close limits by predicting and then correcting residual stresses. (Q25, K1, J1)

794-Q. Deformation and Recrystallization of Silicon Iron. George Wiener and Robert Corcoran. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 901-906.

A study of the orientation and microstructure of 3% Si-Fe alloys after deformation and recrystallization. (Q24, N5, Fe)

795-Q. Effect of Testing Variables on the Hydrogen Embrittlement of Titanium and a Ti-8 Pct. Mn Alloy. R. I. Jaffee, G. A. Lenning and C. M. Craighead. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 907-913.

Effects of increasing hydrogen content, introducing a notch, and changing the strain rate on properties of titanium and one of its alloys were investigated over a range of testing temperatures from −196 to 200° C. (Q23, Ti)

796-Q. Further Studies of the Properties of Rhenium Metal. Chester T. Sims and Robert I. Jaffee. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2 Aug. 1956, p. 913-917.

The thermo-electric behavior of the Pt—Pt-Re thermocouple and the resistance of rhenium to attack by certain molten metals. Data on the stress-rupture behavior of drawn wire, the tensile characteristics of rolled sheet, the variation of Young's modulus with temperature, and the effect of specimen size and fabrication method on the work hardenability. Mechanical properties of thoriated rhenium. (Q23, Q21, Q29, P15, Re)

797-Q. Hydrogen Embrittlement of Beta-Stabilized Titanium Alloys. C. M. Craighead, G. A. Lenning and R. I. Jaffee. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 923-928.

The α-β type alloys are subject to a loss of tensile ductility with increasing hydrogen content. Embrittlement encountered appeared to be of the strain-aging type. Both compositional and structural factors are

shown to influence the hydrogen tolerance of α-β type alloys. (Q23, Ti)

798-Q. Possible Role of Diffusion in the Creep of Alpha and Gamma Iron. Oleg D. Sherby and Jack L. Lytton. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 928-930. (Q3, Ni, Fe)

799-Q. Correlation of the Tensile Properties of Pure Magnesium and Four Commercial Alloys with Their Mode of Fracturing. M. W. Toaz and E. J. Ripling. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 936-946.

Materials and procedure, tensile test results, microscopic investigation. (Q26, Q27, Mg)

800-Q. Preferred Orientations and Magnetic Properties of Rolled and Annealed Permanent Magnet Alloys. W. R. Hibbard, Jr. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 962-967.

Pole figures, torque curves and coercive force determined for Cunife, Cunico, Silmanal, Vicalloy I, Vicalloy II and Heusler's Alloy. (Q24, P16, SG-n)

801-Q. Observations on the Brittle Fracture of Cemented Titanium Carbide. J. R. Low, Jr. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 982-984.

Material used in this study was a TiC-Inconel cermet prepared by infiltration (50% TiC, 50% Inconel: designated as TC66-I). (Q26, H16, Ni, Ti)

802-Q. Internal Friction Studies on Silver and Certain Silver-Base Solid Solutions. S. G. Holder, Jr., E. E. Stansbury and J. H. Frye, Jr. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 993-997.

Internal friction studies on annealed and cold-worked pure silver and alloys of silver with 4.5 at. % each of Cd, Sn and Sb. (Q22, Au)

803-Q. The Effect of Composition on the Mechanical Properties of Al-Si-Cu-Mg Casting Alloys. M. G. Gittins and W. E. Mew. *Metallurgia*, v. 54, no. 322, Aug. 1956, p. 71-76.

Influence of copper and magnesium content on mechanical properties. (Q general, Al, Si, Cu, Mg)

804-Q. Mechanical Testing of Steel. S. Visvanathan. *Tisco*, v. 3, July 1956, p. 75-85.

Objects of mechanical testing, description of tests employed, variables affecting test data. (Q general, ST)

805-Q. Low-Temperature Properties of Steels. S. N. Anant Narayan. *Tisco*, v. 3, July 1956, p. 86-94.

Necessity for a thorough knowledge of the mechanical properties of steels at low temperatures. Changes in the tensile properties with decreasing temperature. Notch-sensitivity of ferritic steels and brittle fracture. Effect of chemical composition, structure and steelmaking and rolling processes. Influence of design and methods of fabrication. Choice of steels for low-temperature service. (Q23, Q26, ST)

806-Q. The Influence of Steelmaking Practice on the Mechanical Properties of Steel. J. S. Vatchagandhy. *Tisco*, v. 3, July 1956, p. 113-123.

Factors in steelmaking processes influencing the mechanical properties of the product, comparison of acid, basic and Bessemer steels, effect of nitrogen content, features of the electric, duplex, and oxygen steelmaking processes, influence of trace elements. (Q general, D general, ST)

807-Q. Influence of Mechanical Treatment on the Properties of Steel. P. K. Chakravarty. *Tisco*, v. 3, July 1956, p. 124-134.

Effects of hot rolling, press forging and hammer forging on strength and ductility; influence of cold rolling, cold drawing, cold extrusion and cold heading operations, limitations of cold working owing to work-hardening characteristics; plastic cycles; anisotropy of hot and cold-worked steel, improvement in fatigue limit by surface cold work. (Q general, F general, G general, ST)

808-Q. Influence of Thermal Treatment on the Mechanical Properties of Steels. G. K. Bapat. *Tisco*, v. 3, July 1956, p. 135-143.

Necessity of heat treatment for obtaining desired balance of mechanical properties, changes in the properties of 0.40% carbon steel by various heat treatments, relation of properties with microstructure, heat treatment as a method of obtaining the desired structure and surface hardening of steel. (Q general, J general, M27, ST)

809-Q. Theories of Fracture. V. G. Paranjpe. *Tisco*, v. 3, July 1956, p. 144-152.

Various types of fractures, divergence between theoretical and observed strengths, theories of brittle and ductile fractures, brittle fracture in normally ductile materials, fatigue and intercrystalline failures, effect of structural heterogeneity on initiation and propagation of fracture. (Q26)

810-Q. Effects of Neutron Bombardment Upon the Properties of ASTM Type SA2112B Steel. M. L. Bleiberg. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-T-206, Oct. 1955, 48 p.

Purpose of investigation: to determine changes in impact strength of 0.29% carbon boiler plate steel as a result of neutron bombardment and correlate changes with neutron flux intensity; interpret nature of embrittlement mechanism, correlating impact data with hardness and electrical resistivity; remove "radiation damage" by annealing heat treatments. (Q6, Q29, P15, AY)

811-Q. (English.) The Relationship Between Load Spectra and Fatigue Life. Bo Lundberg and Sigge Eggwertz. *Aeronautical Research Institute of Sweden, Report no.* 67, 1956, 32 p.

Load spectra for fighter and transport planes can be approximated by a straight line in a semilog plot. The important parameter of straight-line spectra is the slope, the possible variation of which is analyzed. (Q7)

812-Q. (French.) The Variation of the Mechanical Properties of Gray Cast Irons in Relation to Their Thickness. M. Michel Ferry. *Fonderie*, 1956, no. 126, July 1956, p. 267-273.

A theoretical study of the simultaneous variation of tensile strength, modulus of elasticity and hardness of gray cast irons as a function of thickness. (Q23, Q21, Q29, CI)

813-Q. (French.) Periodic Creep of Heat Resisting Alloys. Georges Vidal. *Revue de Métallurgie*, v. 53, no. 7, July 1956, p. 485-496.

Tests were carried out at 800° C. on a "Nimonic 90" alloy, used for the making of aeronautic turboreactor blades. (Q3, T24, Ni)

814-Q. (German.) Influence of Microstructure on the Fatigue Strength of Wrought Aluminum Alloys. E. Straube. *Aluminium*, v. 32, no. 8, Aug. 1956, p. 476-479.

Practical examples show the effect of microstructure and homogeneity on the fatigue strength of heat treatable alloys. (Q7, M27, Al)

815-Q. (German.) Effect of Pores in Welded Butt Joints. B. Lauterberg. *Oerlikon Schweissmitteilungen*, v. 14, no. 25, Aug. 1956, p. 5-19.

Static strength, brittle fracture, fatigue strength, preparation of experimental specimens and method of testing. (Q23, Q7, K9)

816-Q. (German.) Properties of Austenitic Steels Having High Strength at Elevated Temperatures Which Were Melted Under Reduced Pressure. Karl Bungardt and Heribert Sychrovsky. *Stahl und Eisen*, v. 76, no. 16, Aug. 9, 1956, p. 1040-1047; disc., p. 1047-1049.

Behavior of alloying and accompanying elements of the steel in melts originating from the vacuum-melting induction furnace. (Q general, D8, AY)

817-Q. (Russian.) The Nature of Reversible and Nonreversible Temper Brittleness in Structural Steel. V. S. Meskin. *Metallovedenie i Obrabotka Metallov*, no. 7, July 1956, p. 24-34.

Theoretical discussion. (Q23, ST)

818-Q. (Russian.) Causes of Nonreversible Annealing Brittleness. B. A. Stetsenko. *Metallovedenie i Obrabotka Metallov*, no. 7, July 1956, p. 35-38.

Decrease in toughness of the steel in tempering cannot be explained solely by the decomposition of the residual austenite. (Q23, J29, N8, ST)

819-Q. (Russian.) Effects of the Material of Surrounding Parts on the Fatigue Strength of Axles and Shafts. I. V. Kudriatsev and N. M. Savvina. *Vestnik Mashinostroeniia*, v. 36, no. 7, July 1956, p. 10-14.

A study of the decrease in fatigue strength of axles and shafts where they are in contact with fixed parts, such as the inner races of roller bearings. (Q7)

820-Q. Effect of Vacuum Degassing on Properties of Aluminum Alloys. E. E. Layne and H. F. Bishop. *Foundry*, v. 84, Sept. 1956, p. 118-123.

Investigation of the extent to which gas elimination by vacuum treatments may improve mechanical properties. (Q general, E25, Al)

821-Q. Brinell Hardness Testing. J. Léonard. *Foundry Trade Journal*, v. 101, Aug. 16, 1956, p. 173-175.

The 2.5 mm.-187.5 kg. combination of ball and load permits accurate reading, testing close to an edge, impressions close to one another, appreciation of scatter and good average results. (Q29)

822-Q. Elastoplastic Thick-Walled Tubes of Work-Hardening Material Subject to Internal and External Pressures and to Temperature Gradients. D. R. Bland. *Journal of the Mechanics and Physics of Solids*, v. 4, Aug. 1956, p. 209-229.

Using Tresca's yield criterion and its associated flow rule, solutions are obtained for the stresses, the elastic and plastic strains, and the displacements. (Q25)

823-Q. Creep of Polycrystalline Aluminium as Determined From Strain Rate Tests. J. Weertman. *Journal of the Mechanics and Physics of Solids*, v. 4, Aug. 1956, p. 230-234.

Tests of high-purity aluminum over a wide temperature range. (Q3, Al)

824-Q. The Plastic Yielding of Shallow Notched Bars Due to Bending. A. P. Green. *Journal of the Mechanics and Physics of Solids*, v. 4, Aug. 1956, p. 259-268 + 1 plate.

Plain strain solutions are modified for shallow notched bars, so that plastic deformation extends to the notched face. (Q24, Q5)

825-Q. Creep Relaxation for Combined Stresses. J. E. Griffith and Joseph Marin. *Journal of the Mechanics and Physics of Solids*, v. 4, Aug. 1956, p. 283-293.

Develops a theory for predicting stress relaxation-time relations for creep in the case of combined stresses based on an assumed constant stress-creep-time relation. (Q3, Al)

826-Q. Scatter of Fatigue Life of Structural Steel and Its Influence on Safety of Structure. Ichiro Konishi and Masanobu Shinozuka. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 18, no. 2, Apr. 1956, p. 73-83.

The frequency distribution was interpreted by the theory of the stochastic process. (Q7, S21, ST)

827-Q. Induction Hardening as a Means of Increasing the Resistance to Wear of Internal Combustion Engines and Machinery. G. W. Seulen. *Metal Treatment and Drop Forging*, v. 23, Aug. 1956, p. 305-310, 314.

Latest equipment and machines, modern techniques employed. (Q9, J2, ST)

828-Q. Physical & Metallurgical Aspects of Creep. I. Physical Considerations. L. A. Phelps. *Metal Treatment and Drop Forging*, v. 23, Aug. 1956, p. 311-314.

Various theories of the mechanism of creep in metals. (Q3)

829-Q. The Fatigue of Rock-Drill Rods. D. S. Kemsley. *Mine & Quarry Engineering*, v. 22, Sept. 1956, p. 386-389.

Concludes that the majority of steel rock drill rod fatigue failures are due to corrosion fatigue, rather than dry fatigue or to a purely mechanical stress distribution. (Q7, S21, TS)

830-Q. Creep in Metal Crystals at Very Low Temperatures. N. F. Mott. *Philosophical Magazine*, v. 1, 8th ser., no. 6, June 1956, p. 568-572.

Theory based on the hypothesis that dislocations can pass through barriers, such as those provided by dislocations crossing the slip plane, owing to the quantum-mechanical tunnel effect. (Q3, M26)

831-Q. The Stages in a Process of Severe Metallic Wear. M. Kerridge and J. K. Lancaster. *Royal Society, Proceedings*, v. 236, ser. A, Aug. 2, 1956, p. 250-264 + 1 plate.

Radioactivity methods used to study the wear of brass against a harder material under conditions where the debris produced was metallic. (Q9, Cu)

832-Q. The Wear of Metals Under Unlubricated Conditions. J. F. Archard and W. Hirst. *Royal Society, Proceedings*, v. 236, ser. A, Aug. 2, 1956, p. 397-410 + 1 plate.

The wear rate is accurately proportional to the load where the same surface conditions exist. Once equilibrium surface conditions are established, the wear rate is independent of the apparent area of contact. (Q9)

833-Q. How Shot Peening Improves Fatigue Strength. H. J. Grover. *SAE Journal*, v. 64, Aug. 1956, p. 28-30.

Three ways in which the method may be expected to influence fatigue strength. Surface roughening of previously polished surfaces lowers fatigue strength, while surface work hardening and residual stresses usually improve it. (Q7, G23, ST)

834-Q. Some Experiments in the Lubrication of Stainless Steels. I. G. D. Jourdan. *Scientific American*, v. 8, Aug. 1956, p. 14-18.

Studies of the ability of a range of additive type, paraffinic base, mineral oils to "wet" a range of materials. Determination of friction, temperature and wear features of bearing materials running under load. (Q9, SS)

835-Q. Effects of Intermittent Versus Continuous Heating Upon the Tensile Properties of 2024-T4, 6061-T6 and 7075-T6 Alloys. G. W. Stickley and H. L. Anderson. *U. S. National Advisory Committee for Aeronautics, Technical Memorandum* 1419, Aug. 1956, 7 p.

Determination of the effects of intermittent and continuous heating at 300 and 400° F. for periods of 100 and 200 hr. (Q27, Al)

836-Q. Fatigue-Crack Propagation in Aluminum-Alloy Box Beams. Herbert F. Hardrath, Herbert A. Leybold, Charles B. Landers and Louis W. Hauschild. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3856, Aug. 1956, 33 p.

Specimens with bonded stringers had lower rates of crack growth than other specimens. Rapid rate of crack propagation was found in specimens having covers that were integrally stiffened. (Q7, Al)

837-Q. Slip, Twinning and Fracture in Single Crystals of Iron. J. J. Cox, G. T. Horne, and R. F. Mehl. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 1, 1956, 18 p.

The slip, twinning and fracture characteristics of single crystals of decarburized mild steel were investigated at temperatures from 392 to −321° F. (Q24, Fe)

838-Q. Dynamc Biaxial Stress-Strain Characteristics of Aluminum and Mild Steel. George Gerard and Ralph Papirno. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 2, 1956, 22 p.

New technique for obtaining dynamic stress-strain characteristics of circular diaphragms in the yield region. Utilizes the impact tube for rapidly applying a pressure wave to the diaphragm. (Q23, Q6, Al, CN)

839-Q. Some Exploratory Observations of the Tensile Properties of Metals at Very Low Temperatures. E. T. Wessel. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 3, 1956, 26 p.

Metals with a body-centered cubic lattice structure were the only ones to show a strong dependence of yield strength upon temperature. Quenched and tempered steels and beta-brass exhibited considerable plastic deformation in tests at 4.2° K. Plastic deformation occurred primarily by a series of repeated discontinuous yields. (Q general)

840-Q. Effect of Strain Rate and Temperature on the Plastic Deformation of High Purity Aluminum. T. A. Trozera, O. D. Sherby and J. E. Dorn. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 4, 1956, 14 p.

Over wide ranges of temperature and strain rate, identical stress-strain curves are obtained at identical values of the Zener-Hollomon parameter Z. (Q24, Q27, Al)

841-Q. The Effect of Subboundaries and Carbide Distribution on the Notch Toughness of an Ingot Iron. J. C. Danko and R. D. Stout. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 5, 1956, 13 p.

Solution treated, quenched and aged ingot iron had a transition temperature approximately 100° F. lower than annealed iron of the same ferrite grain size. An increase in subboundaries raised the transition temperature. (Q23, Q6, Fe)

842-Q. Notch Ductility of Malleable Irons. G. A. Sandoz, N. C. Howells, H. F. Bishop and W. S. Pellini. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 6, 1956, 33 p.

Drop-weight tests were conducted to establish the temperature at which there is complete loss of ductility in the presence of a sharp, crack-like notch. (Q23, CI)

843-Q. The Deformation and Rupture of Gray Cast Iron. W. R. Clough and M. E. Shank. *American Society for Metals, Transactions*, v. 49, *Preprint* No. 8, 1956, 26 p.

Density decrease during plastic deformation is a smooth function of applied stress, and is greater for biaxial tensile stressing than for uniaxial stressing. Fracture occurs in a direction normal to the greatest stensile stress, and is mostly of a ductile nature. (Q24, Q26, CI)

844-Q. Relative High Temperature Properties of the Hexagonal-Closed-Packed and Body-Centered-Cubic Structures in Iodide-Titanium. John Lunsford and Nicholas J. Grant. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 9, 1956, 12 p.

Stress-to-rupture properties of iodide-titanium were investigated in air from 1000 to 1990° F. around the alpha-to-beta transformation temperature of 1620° F. (Q general, Ti)

845-Q. The Influence of Alloying on the Elastic Modulus of Titanium Alloys. W. H. Graft, D. W. Levinson and W. Rostoker. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 10, 1956, 17 p.

Using a dynamic method of measurement, the elastic modulus and elastic modulus-to-density ratio were explored in the range of room temperature to 750° F. (Q21, Ti)

846-Q. The Effect of Sulphur on the Properties of Titanium and Titanium Alloys. L. W. Berger, D. N. Williams and R. I. Jaffee. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 12, 1956, 18 p.

Additions of up to 0.025 wt. % sulphur resulted in increased tensile strength and decreased ductility. Sulphur had no effect on beta-to-alpha transformation temperatures. Very small additions effectively refined the grain size. (Q23, M27, Ti)

847-Q. The Temperature Dependence of the Hardness of "Pure" Iron and Various Ferritic Steels. F. Garofalo, G. V. Smith, and D. C. Marsden. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 15, 1956, 30 p.

The change of hardness with temperature was determined for various "pure" irons, low carbon commercial steels and chromium steels. (Q29, Fe, ST)

848-Q. The Influence of Bainite on Mechanical Properties. R. F. Hehemann, V. Luhanov and A. R. Troiano. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 16, 1956, 23 p.

At a constant strength level, high-temperature bainite lowers yield strength, reduction in area and impact energy. A heat treatment involving the formation of small amounts of high-temperature bainite prior to quenching appears to be commercially feasible. (Q general, M27, AY)

849-Q. Creep and Stress Rupture Properties of Zirconium, Effect of Annealing Treatment. R. W. Guard and J. H. Keeler. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 18, 1956, 18 p.

Significant creep does not occur at stresses below the yield strength at temperatures below 300° C. Effect of annealing treatment is significant only at 500° C. where the creep rupture stress of β annealed material is significantly larger than that of α annealed material. (Q3, Q4, J23, Zr)

850-Q. The Plastic Deformation of Uranium on Thermal Cycling. H. H. Chiswik. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 21, 1956, 31 p.

The growth rates of uranium rods on thermal cycling are functions of both preferred orientation and grain size. Beta-treatment reduces the growth considerably but does not completely eliminate it. Room temperature thermal expansion coefficients are good qualitative guides in evaluating comparative growth behavior. (Q24, U)

851-Q. Impact Characteristics and Mechanical Properties of Leaded and Nonleaded C-1050 and C-1141 Steels. A. P. Weaver. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 22, 1956, 17 p.

Tests show only slight differences in Brinell hardness and tensile properties, but Charpy "V" notch transition temperatures are consistently lower on the leaded steels than on the nonleaded steels. (Q6, Q general, CN, Pb)

852-Q. Relation of Inclusions to the Fatigue Properties of SAE4340 Steel. H. N. Cummings, F. B. Stulen and W. C. Schulte. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 23, 1956, 36 p.

Fatigue test data. An explanation concerning the mechanism of fatigue. (Q7, AY)

853-Q. Effect of Silicon on Transverse Properties and on Retained Austenite Content of High Strength Steels. John Vajda, John J. Hauser and Cyril Wells. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 24, 1956, 34 p.

The effects of adding 1 and 1.5% silicon to an AISI 4340 steel on the transverse mechanical properties and retained austenite content of end-quenched 7 x 7-in. rounds in the as-quenched, as well as in the quenched and tempered condition, were determined. (Q general, N8, AY)

854-Q. Bend: Tensile Relationships for Toolsteels at High Strength Levels. John C. Hamaker, Jr., Vance C. Strang and George A. Roberts. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 25, 1956, 30 p.

Two tungsten-chromium tool steels of medium and high carbon content were tested in tension and bending to establish preliminary conversion relationships between the two test methods. (Q5, Q27, TS)

855-Q. High Temperature Rupture-Strength Properties of Chromium-Nickel Stainless Steels Containing Titanium and Boron. J. Salvaggi and L. A. Yerkovich. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 33, 1956, 19 p.

Titanium, boron and carbon are all capable of improving the 100-hr., 1500° F. rupture strength of 10 Cr—8 Ni and 17 Cr—12 Ni—2.5 Mo stainless steels heat treated in the range of 2100 to 2300° F. (Q4, SS)

856-Q. Effect of Environment on Creep-Rupture Properties of Some Commercial Alloys. Paul Shahinian. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 34, 1956, 22 p.

The creep-rupture properties of the alloys, DM 45, 12% Cr-V steel, AISI 304, N-155, S-816, and Inconel X were determined in atmospheres of air, oxygen, nitrogen, helium and vacuum. (Q3, Q4, SG-h)

857-Q. The Mechanical Properties of Iron-Aluminum Alloys. W. Justusson, V. F. Zackay and E. R. Morgan. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 36, 1956, 18 p.

Effect of processing variables such as melting and casting practices, hot working and heat treatment, and alloying elements on mechanical properties. (Q23, Fe, Al)

858-Q. The Mechanical Properties of Swaged Iodide-Base Chromium and Chromium Alloys. D. J. Maykuth and R. I. Jaffee. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 38, 1956, 10 p.

Swaged iodide chromium with a fibrous structure and tested as a round bar shows excellent tensile ductility which is lost after the material has been recrystallized. Recrystallized chromium-base alloys with 50% iron or nickel, tested as bar stock, have excellent tensile ductility. (Q21, Q23, Cr)

859-Q. Effect of Dispersion of Alpha Phase on the High Temperature Fatigue Properties of Alpha-Beta Brass. J. E. Breen and Joseph R. Lane. *American Society for Metals, Transactions,* v. 49, *Preprint No.* 39, 1956, 24 p.

A comparison at elevated temperature, of the tensile-fatigue and stress-rupture properties of a two-phase alloy as modified by changes in dispersion. (Q7, Cu)

860-Q. (English.) **Characteristic Directions of Certain Equations of Plasticity.** J. L. Ericksen. *Mathematika,* v. 3, no. 5, June 1956, p. 56-62.

A partial solution of the basic mathematical problem involved in the theory of plasticity. (Q24)

861-Q. (Czech.) **Some Experiences With the Ascertainment of Internal Stress in Big Forgings of Steam Turbine Rotors.** Oldrich Kerkovsky and Oldrich Zebrak. *Hutnické Listy,* v. 11, no. 8, Aug. 1956, p. 472-477.

Stress is calculated from the diametric deformation of a ring cut from the rotor body. (Q25)

862-Q. (French.) **Modes of Deformation in Metals.** L. Habraken and T. Greday. *Revue Universelle des Mines,* v. 12, ser. 9, no. 99, Aug. 1956, p. 209-227.

Present knowledge about the deformation of metallic monocrystals and polycrystals. Theoretical interpretation in relation to the properties of dislocation. (Q24)

863-Q. (German.) **Testing of Non-alloyed Steels in Multi-Axis Stress Conditions by Means of Inner Pressure Tests.** Alfred Krisch. *Archiv für das Eisenhüttenwesen,* v. 27, no. 8, Aug. 1956, p. 531-537.

Tensile test with an additional inner pressure on hollow specimens of nonalloyed, rimmed and killed Thomas and Siemens-Martin Steels with 0.04 to 0.2% carbon, under normal annealed and artificially aged conditions. (Q27, CN)

864-Q. (Japanese.) **Measurement on Ratio of Elongation of Ferrite Grain.** Tetsutaro Mitsuhashi and Yuzo Hosoi. *Journal of Mechanical Laboratory (Japan),* v. 10, no. 4, July 1956, p. 132-135.

Two methods of measurement and results for aluminum-killed and rimmed Armco sheets. (Q23, Fe)

865-Q. (Russian.) **Effect of Local Plastic Deformation on the Strength of Steel.** A. E. Asnis. *Avtomaticheskaia Svarka,* v. 9, no. 3, May-June 1956, p. 88-94.

Effect of this type of deformation, caused by cutting and punching, on the static and vibrational strength of low carbon openhearth and converter steels. Types of fractures and breaks, including fibrous, crystalline and mixed. (Q23, Q24, G2, G17, CN)

866-Q. (Russian.) **Effect of Local Plastic Deformation of the Edge of Sheets on the Strength of Lap-Welded Joints.** B. F. Lebedev. *Avtomaticheskaia Svarka,* v. 9, no. 3, May-June 1956, p. 95-101.

Results of static tests at low temperatures of joints, with forces along the seam, in the case where one seam is discontinuous and the edge of the metal has been cut on a shearing machine. Nature of tears on cut edge when metal is stretched. (Q23, G15, CN)

867-Q. (Russian.) **Effect of Alloying Elements on the Heat-Resistant Properties of Chromium Stainless Steels.** G. P. Fedortsov and M. F. Sheshenev. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1956, p. 2-16.

Effect of vanadium, columbium, molybdenum and titanium on mechanical properties of chromium stainless steels at various temperatures. Their effect in relation to variations of heat treatment, including aging, and varying carbide content. Effect on creep and long-term strength. (Q general, SS-h)

868-Q. (Russian.) **Heat-Resistant Steels for Use at 550-600°.** L. Ia. Liberman and A. V. Boeva. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1956, p. 16-25.

Microstructure, long-term creep strength, and other mechanical properties of steels in relation to variations in heat treatment. (Q general, J general, M27, SS-h)

869-Q. (Russian.) **Effect of Cold Plastic Deformation on Irreversible and Reversible Temper Brittleness.** M. M. Shteinberg, V. D. Sadovskii and A. V. Demakova. *Metallovedenie i Obrabotka Metallov,* no. 6, June 1956, p. 26-35.

Effect of deformation on hardness and impact toughness in relation to tempering temperatures. Effect of heat treatment variations. (Q23, Q6, Q29, J29, CN)

870-Q. (Book.) **Residual Welding Stresses.** R. Gunnert. 135 p. 1955. Almqvist & Wiksell, Stockholm.

Method for measuring residual stresses and its application to a study of residual welding stresses. (Q25, K general)

R. Corrosion

417-R. Metal Transport in Liquid-Water Systems and Effect on Heat Transfer. S. C. Datsko. *ASME Transactions,* v. 78, Aug. 1956, p. 1223-1227.

Effects on heat transfer caused by the corrosion of zirconium tubes and by the deposition of corrosion products of a stainless steel system on the zirconium-tube walls. (R4, SS, Zr)

418-R. The Reaction of Hydrogen With Uranium Alloy Types. William M. Albrecht and Manley W. Mallett.

Battelle Memorial Institute, Metallurgy and Ceramics, Report no. 1108, July 1956, 16, p.

Reactions with various alloys were investigated in the range 100 to 425° C. to determine effect of structure upon reaction rates. (R9, P13, U)

419-R. Earth Potential or Surface Potential Gradient Tests on Buried Cables. Daniel R. Werner. *Corrosion,* v. 12, Aug. 1956, p. 376-384.

Topics include range of potentials, selection of areas for tests, installation of remedial measures on buried telephone cables, determination of buried structure location and meter circuits for measuring potential gradients. (R10)

420-R. A Laboratory Method for the Evaluation of Oil Production Corrosion Inhibitors. David B. Boies. *Corrosion,* v. 12, Aug. 1956, p. 371-375.

Effects on inhibitor performance of such variables as temperature, oil-brine ratio, aromatic content of oil blend and composition of gas phase shown graphically. (R10)

421-R. The Role of Crevices in Decreasing the Passivity of Titanium in Certain Solutions. David Schlain and Charles B. Kenahan. *Corrosion,* v. 12, Aug. 1956, p. 422-426.

A possible explanation is that corrosion in the air-starved crevices (anodic surfaces) results in the flow of electrons to and the evolution of active hydrogen on the remainder of the titanium specimen (cathodic surfaces), thus destroying the protective oxide film. (R10, Ti)

422-R. The Stress-Corrosion of Certain Aluminium Alloys. H. K. Farmery and U. R. Evans. *Institute of Metals, Journal,* v. 84, July 1956, p. 413-422 + 2 plates.

Effect of surface condition on stress-corrosion cracking, effects of pre-immersion, electrolyte and junction with other metals. Variation of life with applied stress and with exposed area. (R1, Al)

423-R. Stress-Corrosion Cracking of Brass. *National Bureau of Standards, Technical News Bulletin,* v. 40, Aug. 1956, p. 109-110.

Crystal orientation has an important influence on the galvanic action which causes stress-corrosion cracks. (R1, Cu)

424-R. Static Corrosion Behavior of Materials in Bismuth and Uranium-Bismuth Solution at 550° C. J. E. Atherton, O. F. Kammerer, C. J. Klamut and J. Sadofsky. *Brookhaven National Laboratory (U. S. Atomic Energy Commission),* BNL-395 (T-76), Aug. 1954, 8 p.

Intermediate chromium steels corrode in such solutions. The addition of small amounts of magnesium and zirconium to the bismuth makes this corrosion negligible. (R6, R10, U, Bi)

425-R. The Intergranular Corrosion of Aluminum in Superheated Steam. C. Groot and R. E. Wilson. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission),* HW-41797, May 1956, 18 p.

Intergranular attack is quite localized in the earlier stages. Effects of temperature, pressure and composition are shown. Lack of iron results in poor resistance to intergranular attack. (R2, R4, Al)

426-R. Mathematical Analysis of Galvanic Corrosion. VI. Electrode Systems With Cylindrical Geometry. VII. Some Potential Functions for Spherical Electrode Systems. John M. Ruth and James T. Waber. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-1993 and LA-1994, Sept. 1956, 31 and 17 p.

Formal expressions for the interfacial potentials and the dimensionless corrosion current parameter were derived. Various forms of the radial dependence are tabulated. (R1)

427-R. Fundamentals of Liquid-Metal Corrosion. W. D. Manly. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL 2055, July 1956, 10 p.

Types of corrosion, variables affecting corrosion, role of impurities. (R6)

428-R. (German.) Methods of Testing Corrosion. H. Spindler. *Feingerätetechnik,* v. 5, no. 7, July 1956, p. 290-296.

Theoretical fundamentals. Various natural and laboratory testing methods, their advantages and disadvantages. (R11)

429-R. (Russian.) Mechanism of Electrochemical Corrosion of Metals in Soil. N. D. Tomashov and In. N. Mikhailovskii. *Doklady Akademii Nauk SSSR,* v. 108, no. 4, June 1, 1956, p. 668-671 + 1 plate.

Effects of formation of corrosion couples on corrosive action. (R1, R8)

430-R. (Russian.) Corrosion of Chemical Apparatus by Aqueous Solution of Mono-Ethanolamine. M. L. Rutkovskii. *Khimicheskaia Promyshlennost',* no. 3, Apr.-May 1956, p. 25-28.

Corrosion of carbon steel is initiated by corrosive compounds in the mono-ethanol amine. By distilling under vacuum the compounds can be eliminated. (R7, CN)

431-R. Effects of pH and Velocity on Corrosion of Steel Water Pipes. Rolf Eliassen, Clemente Pereda, Amilcar J. Romeo and Rolf T. Skrinde. *American Water Works Association, Journal,* v. 48, Aug. 1956, p. 1005-1018.

Past investigations, objectives of study, experimental apparatus, observed effect of pH, mechanism of pH effects, theoretical velocity effects. (R4, ST)

432-R. The Effect of Sulphur Dioxide on the Oxidation of Copper. T. Mills and U. R. Evans. *Chemical Society, Journal,* July 1956, p. 2182-2196.

Sulphur dioxide accelerated the oxidation of copper, although it did not alter the mechanism of the film-growth laws. (R2, R9, Cu)

433-R. The Oxygen Concentration Cell as a Factor in the Localized Corrosion of Metals, Wilson Lynes. *Electrochemical Society, Journal,* v. 103, Aug. 1956, p. 467-474.

The current produced by an oxygen concentration cell is considered in terms of the open-circuit potentials and polarizing characteristics of the anode and cathode and the resistance of metal and electrolyte. (R1, Al, Cu, Fe, Ti)

434-R. The Mechanism of the Inhibition of Corrosion by the Pertechnetate Ion. IV. Comparison With Other XO_4^{n-} Inhibitors. R. F. Sympson and G. H. Cartledge. *Journal of Physical Chemistry,* v. 60, Aug. 1956, p. 1037-1043.

Covers measurements with the pertechnetate, chromate, molybdate and tungstate ions as inhibitors and the chloride, thiocyanate, sulfate and perrhenate ions as noninhibiting competing ions. (R10)

435-R. Mathematical Analysis of Galvanic Corrosion. VIII. Alternating System of Electrodes With Interposed Insulators. James T. Waber and John M. Ruth. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-2028, Apr. 1956, 14 p.

The formal expression for the potential throughout the corrodent is derived. Distribution of current density over the anode is expressed in terms of a simple trigonometric formula. (R1)

436-R. (Czech.) Industrial Applications of Vapor Phase Corrosion Inhibitors. J. Ruzicka. *Strojirenska Vyroba,* v. 4, no. 6, June 1956, p. 256-259.

Protecting metal articles from corrosion between processing operations and when finished. Treated paper wrapping. Properties, types and advantages of vapor phase inhibitors. Use in lubricants and hydraulic control systems. (R10)

437-R. (French.) Corrosion in the Chemical Industry. Pierre Bachmann. *Chimia (Switzerland),* v. 10, no. 8, Aug. 1956, p. 189-194.

Different corrosion mechanisms, chemical and electrochemical corrosion, measurement of corrosion. (R1, R11)

438-R. (French.) Corrosion Prevention. D. Pétrocokino and J. Frasch. *Corrosion et Anticorrosion,* v. 14, no. 7, July-Aug. 1956, p. 246 to 251.

Problems of corrosion prevention by cathodic protection inhibitors, and coatings. (R10, L26)

439-R. (French.) The Process of Oxidizing Metals and Alloys at High Temperatures. J. Bénard. *Métaux, Corrosion-Industries,* v. 31, nos. 371-372, July-Aug. 1956, p. 306-310.

Factors influencing oxidizability of metals and alloys as influenced by the oxide layer between metal and oxygen, nature of component metals, impurities and surface temperature. (R2)

440-R. (French.) Influence of Iron and Silicon Contents on the Corrosion Resistance of A-U2GNZr. Roger Chevalier and Roger Lerner. *Revue de l'Aluminium,* v. 33, no. 233, June 1956, p. 609-613.

Results show that the most notable effect of corrosion on turbo-jet compressor blades is a reduction of the elongation; anodization offers a very effective protection but tension fosters corrosion. (R general, L19, Al)

441-R. (German.) Electrochemical Investigations of the Effect of Mill Scaling of Steel on Corrosion and on the Etching Process. Franz Wever and Hans-Jürgen Engell. *Archiv für das Eisenhüttenwesen,* v. 27, no. 7, July 1956, p. 475-486.

Effect of local elements, mechanism of etching, effect of dissolved oxygen and pH value. (R2, R11, ST)

442-R. (German.) Study of Corrosion. IV. Electrochemical and Corrosion-Kinetic Study of Zinc in Water. K. Smrcek and K. Barton. *Collection of Czechoslovak Chemical Communications,* v. 21, no. 2, Apr. 1956, p. 339-348.

Corrosion behavior in city, industrial, distilled and sea waters at 20 to 95° C. (R1, R4, Zn)

443-R. (Italian.) Atmospheric Corrosion Stations of the I.S.M.L. G. Luft. *Alluminio,* v. 25, no. 7-8, July-Aug. 1956, p. 321-332.

Installation at Arenzano and Novara, results on the behavior of rolled light alloys exposed to industrial, urban and marine atmospheres. (R3, Al)

444-R. (Italian.) Researches on the Oxidation of Metals and Alloys in the Fused State. I. Lead. II. Cadmium. III. Tin. IV. The System Tin-Lead. V. The System Lead-Cadmium. Paolo Spinedi. *Gazzetta Chimica Italiana,* v. 86, nos. 5, 6, and 7, May, June, and July, 1956, p. 561-608.

A study of the behavior in the solid or liquid state using a continuous recording thermogravimetric

method. Graphic representation of the oxidation speed. Comparison with other work.
(R2, C general, Pb, Cd, Sn)

445-R. (Italian.) **On High-Temperature Corrosion of Metals by Vanadium Dioxide. I. Research on System Metal-Vanadium-Oxygen.** V. Cirilli, A. Burdese and C. Brisi. *Metallurgia Italiana*, v. 48, no. 7 July 1956, p. 309-316.

Equilibrium diagrams between vanadium dioxide and iron, chromium, nickel and cobalt peroxides.
(R9, R6, Fe, Cr, Ni, Co)

446-R. (Russian.) **Investigation With Radioactive Indicators of the Reaction Mechanism of Thiophosphoro-Organic Additives to Oils.** G. V. Vinogradov, M. M. Kusakov, P. I. Sanin, Iu. S. Zaslavskii, E. A. Razumovskaia, A. V. Ul'ianova and D. V. Riabova. *Khimiia i Tekhnologiia Topliva*, no. 6, June 1956, p. 14-20.

Antiwear properties of additives. Effects of presence of phosphorus and sulfur. (R10, Q9, ST, Cu)

447-R. Applications of Plastics in Marine Cathodic Protection Systems. Herman S. Preiser and Maxwell Stander. *American Society for Naval Engineers, Journal*, v. 68, Aug. 1956, p. 581-590.

Plastics have proved to be versatile materials with almost an unlimited range of properties and are admirably suited for use in fabrication of cathodic protection equipment. (R10)

448-R. Two Cases of Corrosion in Suburban New York Disguised as Galvanic—Their Cause and Mitigation. W. Searle Woodward. *Corrosion*, v. 12, Sept. 1956, p. 427-432.

Reports instances in which stray current potentials were mistaken for galvanic potentials from underground lead-sheathed telephone cables to ground. Development of suitable meters enabled determination of true potentials of the cables.
(R8, Pb)

449-R. Steel Surface Properties Affect Internal Corrosion Performance of Tin Plate Containers. A. R. Willey, J. L. Krickl and R. R. Hartwell. *Corrosion*, v. 12, Sept. 1956, p. 433-440.

Two easily performed laboratory tests were developed—One, the "rate of pickling" test, the other, the "iron solution" test. (R5, R11, ST, Sn)

450-R. Aqueous Corrosion of Aluminum. I. Behavior of 1100 Alloy. J. E. Draley and W. E. Ruther. *Corrosion*, v. 12, Sept. 1956, p. 441-448.

Aluminum alloy 1100 corrodes uniformly in nearly pure water at rates which increase with temperature. Corrosion rate reduced by addition of an acid. Corrosion in slightly alkaline solutions (pH 8.5) is more rapid than in neutral water at all temperatures. (R4, Al)

451-R. Behavior of 18-8 Stainless Steel in 2-Normal Boiling Nitric and Sulfuric Acid-Mixtures. P. E. Krystow and M. Balicki. *Corrosion*, v. 12, Sept. 1956, p. 449-454.

When exposed to a range of boiling 2*N* sulphuric-nitric acid solutions the steels pass through a passive zone of negligible corrosion, a transition zone of irregular corrosion and two active zones of substantial corrosion. (R5, SS)

452-R. Attack of Scaling-Resistant Materials by Vanadium Pentoxide and Effect of Various Alloying Elements Thereon. E. Fitzer and J. Schwab. *Corrosion*, v. 12, Sept. 1956, p. 459-464.

Possibilities of developing metallic materials able to stand up under the attack by the combustion gases in crude-oil fired gas turbines.
(R9, Ni, ST)

453-R. The Relation of Thin Films to Corrosion. Thor N. Rhodin. *Corrosion*, v. 12, Sept. 1956, p. 465-475.

Evaluation of the resistance to pitting corrosion of silicon-modified Type 316L stainless steel. Improved corrosion behavior was correlated with a mutual film-enrichment of silicon and molybdenum and a film-depletion of iron. (R2, SS)

454-R. Cathodic Protection Installation on M. S. "Regent Springbok". *Corrosion Technology*, v. 3, Aug. 1956, p. 251-253, 265.

A well-established and proven method of preventing deterioration due to corrosion of bulkheads, stringers and other members. Design and procedure adopted, together with information on tanker cargo compartment corrosion theory.
(R10, ST)

455-R. An Approach to the Corrosion Problem. Anton deS. Brasunas. *Corrosion Technology*, v. 3, Aug. 1956, p. 261-265.

Nature of corrosion attack, corrosion principles and rates, mitigation. (R1)

456-R. The Fretting Corrosion of Mild Steel. J. S. Halliday and W. Hirst. *Royal Society, Proceedings*, v. 236, ser. A, Aug. 2, 1956, p. 411-425 + 3 plates.

Measurements of the frictional forces, the degree of damage and the variations in the electrical contact resistance for a wide range of applied loads, vibration amplitudes and number of cycles of motion.
(R1, CN)

457-R. A Study of the Air Contamination of Three Titanium Alloys. J. E. Reynolds, H. R. Ogden and R. I. Jaffee. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 11, 1956, 26 p.

Contamination was studied by utilizing the Van Ostrand-Dewey diffusion analysis of microhardness-penetration data. Equations were derived expressing the depth of contamination in terms of a time-temperature parameter. (R2, Ni, Ti)

458-R. Some High-Temperature Oxidation Characteristics of Nickel With Chromium Additions. G. E. Zima. *American Society for Metals, Transactions*, v. 49, *Preprint No.* 37, 1956, 26 p.

The relationship between alloy chromium content and oxidation rate was determined for nickel-chromium alloys containing up to 17 At % chromium. The high oxidation stability was correlated with the presence of Cr_2O_3 in the oxide layer.
(R2, Ni, SG-h)

459-R. (Dutch.) **Corrosion Protection by Means of Inhibitors.** M. Oudeman. *Metalen*, v. 11, no. 14, July 31, 1956, p. 304-309.

The mechanism of corrosion and the effects produced by anodic, cathodic or absorption inhibitors. A survey of various new practical applications. (R10)

460-R. (French.) **Behavior of the Reactive Anodes in Magnesium and in Zinc.** J. Van Muylder and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique*, no. 34, May 1956, 59 p. + 22 graphs.

Theoretical consideration of cathodic protection by reactive anodes, using pH tension diagrams. Relationship between polarization curves and anodic production of current. Influence of metals, medium and density of current on anodes. Practical applications. (R10, Mg, Zn)

461-R. (French.) **Corrosion Prevention in Packing and During Storage.** F. Vandervelden and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique*, no. 37, May 1956, p. 3-8.

Various cleaning and drying methods for metallic parts before packing or storing. Coating processes and packing materials. (R10, L26)

462-R. (Book—German.) **Corrosion of Metals in Aggressive Media.** W. P. Batrakow. (Translated from the Russian by Heinz Frahn.) 511 p. 1954. Verlag Technik, Berlin, East Germany.

Physical-chemical properties of the most common gases and acids. Corrosion of metals and alloys by gases, nitric acid, and sulfuric acid. Corrosion fatigue of metals and alloys. Other corrosion producing media.
(R general)

S

Inspection and Control

499-S. The Nitroso-R Salt Method for the Determination of Cobalt in Ores. B. D. Guerin. *Analyst*, v. 81, July 1956, p. 409-416.

Use of the differential technique of color measurement permits up to 3% cobalt to be determined directly in a 0.2-g. sample, without recourse to chemical separations. The effects of iron, copper and nickel. (S11, Co)

500-S. Foundry Practice. XII. Quality Control. William H. Salmon and Eric N. Simons. *Edgar Allen News*, v. 35, July 1956, p. 148-149.

Control in melting, heat treatment and fettling procedures and in final inspection. (To be continued.) (S12, E10, J23)

501-S. An Optical Method of Flame Temperature Measurement. I. Theory. F. J. Weinberg. **II. Sensitivity and Applications.** J. Reck, K. Sumi and F. J. Weinberg. *Fuel*, v. 35, July 1956, p. 359-369.

Parallel light confined by a narrow slit traverses a flame and gives rise to a curved image of the slit on a photographic plate. The area confined between the image and the straight line from which it deviates is correlated with the final flame temperature and other flame parameters. (S16)

502-S. The Routine Determination of the Hydrogen Content of Aluminium and Aluminium Alloys by the Hot-Extraction Method. C. E. Ransley and D. E. J. Talbot. *Institute of Metals, Journal*, v. 84, July 1956, p. 445-452 + 1 plate.

Apparatus and procedures.
(S11, Al)

503-S. The Use of Electrical Eddy Currents for the Study of Surface Layers. A. P. H. Jennings. *Iron and Steel Institute, Journal*, v. 183, Aug. 1956, p. 415-421.

Study of physical properties and the measurement of coating thickness, particularly that of tin on steel. (S13, S14, P general, Sn, ST)

504-S. Slip Gauge Calibration. F. O. Hutchinson. *Machinery*, v. 89, July 1956, p. 163-167.

Inspection techniques, calibration procedure, precautions necessary with carbide gages. (S13, S14)

505-S. A Comparison Between British En. and American SAE Steels. W. B. Kemmish. *Machinery*, v. 89, July 1956, p. 167-168 + 4 plates.

Tabulated data on chemical compositions and mechanical and physical properties.
(S22, Q general, P general, ST)

506-S. Analytical Determination of Trace Constituents in Metal Finishing Effluents. XVI. The Colorimetric De-

termination of Total and Free Cyanides. E. J. Serfass and R. F. Muraca. *Plating*, v. 43, Aug. 1956, p. 1027-1030.

Method uses a distillation procedure for concentrating and removing the cyanide from either simple or complex cyanides by refluxing the sample with dilute sulfuric acid and cuprous chloride. (S11, L17)

507-S. Determination of Traces of Thorium in Uranium Solutions. Myron O. Fulda. *U. S. Atomic Energy Commission, Research and Development Report*, DP-165, June 1956, 10 p.

A colorimetric method using thorium as the indicator. (S11, Th, U)

508-S. Determination of Trivalent Chromium in the Presence of Chromate. R. W. Cline, R. E. Simmons, and W. R. Rossmassler. *U. S. Atomic Energy Commission, Research and Development Report*, KY-173, July 1956, 6 p.

Trivalent chromium is separated from chromate by precipitating with ammonium hydroxide using aluminum hydroxide as a carrier. (S11, Cr)

509-S. Determination of Cementite (in Steel) in Presence of Vanadium and Molybdenum Carbides. N. M. Popova, A. F. Platonova and L. V. Zaslavskaya. *Henry Brutcher, Translation No.* 3727, 6 p. (Abridged from *Zavodskaya Laboratoriya*, v. 21, no. 1, 1955, p. 22-24.) Henry Brutcher, Altadena, Calif.

In anodic solution, cementite is left undissolved while the vanadium and molybdenum carbides are decomposed into products soluble in excess of alcoholic hydrogen peroxide. (S11, ST)

510-S. Magnetographic Method of Inspection of Welds. A. S. Fal'kevich, F. I. Kislyuk, Yu. V. Usenko and V. M. Lubov. *Henry Brutcher, Translation No.* 3729, 10 p. (Abridged from *Svarochnoe Proizvodstvo*, no. 7, 1955, p. 10-12.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 216-S, 1955. (S13, K9)

511-S. Colorimetric Determination of Aluminum With 'Arsenazo'. V. I. Kuznetsov and R. B. Golubtsova. *Henry Brutcher, Translation No.* 3739, 10 p. (From *Zavodskaya Laboratoriya*, v. 21, no. 12, 1955, p. 1422-1426.) Henry Brutcher, Altadena, Calif.

Nature, structure and properties of 'arsenazo', and control of interfering elements. (S11, Al)

512-S. Determination of Manganese Oxides and Sulfides in Carbon Steels and Their Separation From Manganese Carbides. N. F. Leve and A. B. Gurevich. *Henry Brutcher, Translation No.* 3762, 9 p. (From *Zavodskaya Laboratoriya*, v. 21, no. 9, 1955, p. 1032-1035.) Henry Brutcher, Altadena, Calif.

Determination of sulfidic manganese and of "unstable" and "stable" oxidic manganese in the residues. (S11, CN)

513-S. (English.) Spectrophotometric Determination of Micro Quantities of Titanium With 8-Hydroxyquinaldine. Kenji Motojima. *Chemical Society of Japan, Bulletin*, v. 29, no. 4, June 1956, p. 455-458.

Apparatus and procedures. (S11, Ti)

514-S. (English.) Spectrophotometric Determination of Micro Quantities of Iron, Titanium and Aluminum When They Accompany Each Other. Use of 8-Hydroxyquinaldine and Oxine. Kenji Motojima and Hiroshi Hashitani. *Chemical Society of Japan, Bulletin*, v. 29, no. 4, June 1956, p. 458-460.

Apparatus and procedures. (S11, Fe, Ti, Al)

515-S. Development of Automatic Thickness Control for Tandem Cold Reduction Mills. I. Application. H. S. Maxwell. **II. Design.** M. W. Cannon. **III. Results.** R. W. Holman. *Iron and Steel Engineer*, v. 33, Aug. 1956, p. 132-140.

Automatic thickness control means more uniform quality, equipment has advantages and reliability of transistors, manual control is reduced to a minimum and quality is less subject to human variation. (S14, F23)

516-S. The Spectrographic Analysis of Zirconium and Hafnium. D. A. Del Grosso and F. P. Landis. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1539, May 1956, 52 p.

Spectrographic methods for determination of 31 metallic impurities in zirconium, zirconium alloys and hafnium. High-amperage direct-current arc method is used for hafnium-zirconium ratios, and two carrier-distillation direct-current arc methods are used for most other impurities. (S11, Sn)

517-S. A Non-Destructive Microchemical Method of Sorting Steels. W. R. Nall and R. Scholey. *Metallurgia*, v. 54, no. 322, Aug. 1956, p. 97-102.

A microchemical procedure uses simple, inexpensive apparatus. Classification of unknown steels is based on the estimation of manganese, nickel, chromium and molybdenum. A small number of analyzed steels are used as standards for comparison purposes. (S10, ST)

518-S. Ultrasonic Testing by Immersion Method. J. B. Morgan. *Steel*, v. 139, Aug. 27, 1956, p. 94-96, 98.

Technique lends itself to rapid inspection of regularly shaped objects, but is flexible enough to permit inspection of many complex shapes. (S13)

519-S. Fractures in Service. E. K. N. Nambiar. *Tisco*, v. 3, July 1956, p. 153-162.

Simple overload fractures, fatigue fractures and sources of stress-raisers, effect of temperature on fracture, influence of corrosion, example of service failure investigation. (S21, Q26)

520-S. The Significance of Test Results on Steels in Relation to Performance and to Specifications. E. H. Bucknall. *Tisco*, v. 3, July 1956, p. 163-172.

Distinction between test results and properties. Factors to be considered in choosing steels for various applications. Specifications of properties and methods of determining them. (S22, ST)

521-S. (English.) Diallyldithiocarbamido-Hydrazine as an Analytical Reagent. I. Determination of Copper, Nickel, Zinc, and Lead and Separations of Their Binary Mixtures. N. K. Dutt and K. P. Sen Sarma. *Analytica Chimica Acta*, v. 15, no. 1, July 1956, p. 21-24.

These metals are precipitated quantitatively from their solutions under controlled pH values. Complexes have definite compositions and are capable of being directly weighed in a tared crucible. (S11, Cu, Ni, Zn, Pb)

522-S. (Czech.) Use of Radio-Isotopes in the Foundry. Jaroslav Ruzicka. *Slévarenstvi*, v. 4, no. 7, July 1956, p. 218-222.

Used as simple emission sources or as indicators of stable elements. (S19, E general)

523-S. (French.) The Use of Measuring Devices in Steelmaking. G. Husson and P. Leroy. *Revue de Métallurgie*, v. 53, no. 7, July 1956, p. 554-565.

Devices developed to improve the thermal regularity, blast conditions and precision in starting and stopping operations. (S18, D1, ST)

524-S. (German.) Investigations of Strain Hardened, Low-Carbon, Manganiferous Structural Steels After Annealing. I. Technology and Strength Determination. Friedrich Erdmann-Jesnitizer. *Neue Hütte*, v. 1, no. 7, July 1956, p. 400-413.

Examples of service failures as a result of strain aging. Effects of cold rolling and solidification, hardness behavior of cold rolled and nonrolled materials after annealing. (S21, N7, N12, Q29, AY)

525-S. (German.) Utilization of Radioactive Isotopes in Metallurgy and Metallography. A. Hentsch. *Neue Hütte*, v. 1, no. 7, July 1956, p. 413-419.

Applications such as testing blast furnace linings or determining diffusion velocities. Possible uses in powder metal technology. (S19)

526-S. Determination of Iron in Titanium Sponge, Alloys, and Ores. Howard V. Malmstadt and Charles B. Roberts. *Analytical Chemistry*, v. 28, Sept. 1956, p. 1412-1416.

Automatic derivative spectrophotometric titration with electrolytically generated titanous ion. (S11, Ti, Fe)

527-S. Direct Photometric Determination of Aluminum in Iron Ores. Uno T. Hill. *Analytical Chemistry*, v. 28, Sept. 1956, p. 1419-1424.

Specific spectrophotometric method described is fast, direct and accurate. When measured in a narrow-band instrument, the complex obeys Beer's law up to 10% aluminum or higher. (S11, Al)

528-S. Rapid Photometric Determination of Magnesium in Electronic Nickel. C. L. Luke. *Analytical Chemistry*, v. 28, Sept. 1956, p. 1443-1445.

Oxine method was modified for rapid determinations. Eliminated interfering metals with an ammonium hydroxide separation and by masking others with cyanide. (S11, Mg, Ni)

529-S. Effect of Iron on Determination of Tin in Brass and Bronze. Application of Radioisotope Techniques. C. N. LaRosa, Isadore Geld, Arthur Ticker, S. F. Di Lauro and J. L. Kalinsky. *Analytical Chemistry*, v. 28, Sept. 1956, p. 1447-1451.

Quantitative evaluation of the effect of iron on the nitric acid precipitation of tin. Two digestion temperatures were studied, with iron-59 and tin-113 used as tracers. (S11, Fe, Cu, Sn)

530-S. Statistical Control of Brass Foundry Scrap. Harry St. John. *Foundry*, v. 84, Sept. 1956, p. 114-117.

Use of statistical records to reduce brass casting scrap to as little as record costs can justify. (S12, A8)

531-S. (Czech.) The Influence of Method of Preparing Specimens and of the Size of Their Surfaces on the Determination of Hydrogen in Aluminum by the Vacuum Fusion Method. Lubos Kopa. *Hutnické Listy*, v. 11, no. 8, Aug. 1956, p. 467-472.

Separate determination of surface and interior hydrogen contents. (S11, Al)

532-S. (Italian.) The Radiography of Iron, Steel and Light Alloy Castings. Oscar Grossi, *Fonderia*, v. 5, no. 7, July 1956, p. 337-352.

Radiographic technique, interpretation of X-rays, identification of defects. (S13, CI, EG-a)

533-S. (Polish.) Ultrasonic and Metallographic Testing of 2000-KW. Gen-

erator Rotors. Mieczyslaw Kurek and Tadeusz Terlecki. *Hutnik*, v. 23, no. 7-8, July-Aug. 1956, p. 294-299.

Locating defects not visible to the naked eye. Methods applied to two large rotors, and the defects uncovered. Ultrasonic tests made with Hughes type MK III equipment. (S13, M21, ST)

534-S. (Polish.) **Testing Metals With Ultrasonic Surface Waves.** Jozef Tabin and Miecyslaw Kurek. *Hutnik*, v. 23, no. 7-8, July-Aug. 1956, p. 300-304.

Types of ultrasonic waves, methods of using them. Surface waves for defect detection, examples of use. (S13)

535-S. (Polish.) **Use of Radioactive Isotopes for Defect Detection.** *Przeglad Techniczny*, v. 77, July 1956, p. 303-308.

An introduction to the possibilities and methods of using gamma radiation for improving the quality of metal products. (S13)

T
Applications of Metals in Equipment

217-T. Advances in Gas Turbine Materials. Julius J. Harwood. *Aero Digest*, v. 73, Aug. 1956, p. 20-27.

Review shows that mere improvement of presently used alloying systems is not sufficient and that more imaginative approaches are necessary. (T25)

218-T. Use of Die Castings in Cars Increased by Optional Features. Thomas MacNew. *Automotive Industries*, v. 115, Aug. 1, 1956, p. 56-59.

Uses and possible uses of aluminum, magnesium and zinc die castings in cars. (T21, Mg, Zn, Al)

219-T. Oriented Steel and Today's Turbine Generators. J. W. Staats. *Blast Furnace and Steel Plant*, v. 44, Aug. 1956, p. 940-942, 944.

Mechanical and electrical properties. Advantages include decreased machine losses and heating. (T25, Q23, P15, SG-p)

220-T. Materials for Nuclear Power Reactors. John M. Warde. *Materials & Methods*, v. 44, Aug. 1956, p. 121-144.

Materials selection factors, properties of available materials that can be or have been used in reactors, coolants and nuclear fuels. (T25)

221-T. Spring Materials for High Temperature Service. *Product Engineering*, v. 27, Aug. 1956, p. 186-193.

Data on relaxation and creep at temperatures up to 700° F., recommended design stresses for nickel alloys for light, medium and severe duty, endurance properties and effect of shot peening. (T7, Q general, SG-b)

222-T. (French.) **Tubing No. 80 in Special Steel Produced in France to Resist Cracking Corrosion Caused by Gas Existing at Lacq of High Hydrogen Sulphide Content.** L. Cauchois, J. Didier and E. Herzog. *Corrosion et Anticorrosion*, v. 4, no. 5, May 1956, p. 157-165.

Because of difficult operating conditions at Lacq this special steel tubing, which is more resistant than the usual type, is in use. Corrosion tests are in progress. (T29, R1, SG-g)

223-T. (French.) **Aluminium-Steel Contact Wires.** Louis Albert. *Revue de l'Aluminium*, v. 33, no. 233, June 1956, p. 615-619.

Use of aluminium-steel wires in trolley contact lines. Notes that performance is superior to copper. (T1, ST, Al)

224-T. (Norwegian.) **Building Construction With Aluminum.** Arne Selberg. *Teknisk Ukeblad*, v. 103, no. 27, July 4, 1956, p. 609-617.

Properties and possibilities of application of aluminum and aluminum alloys in buildings. (T26, Al)

225-T. (Russian.) **An Experiment in Using Austenitic Steels in Boiler Plants Operating at Ultra-High Temperatures and Pressures (600° C. and 300 Atmospheres).** In Lagunstov. *Teploenergetika*, v. 3, no. 8, Aug. 1956, p. 39-43.

Tests on heat resistant steel EI257 indicate that it is not suited for use with ultra-high steam pressures and temperatures because of intercrystalline corrosion and other defects arising during use. Chemical composition. (T25, R2, AY)

226-T. (Russian.) **Pipes Made of Heat Resistant Alloy.** V. S. Mikheev. *Vestnik Akademii Nauk SSSR*, v. 26, no. 27, July 1956, p. 40-42.

Pipes made of an aluminum-chromium-iron alloy which has high melting point (1500°), is heat resistant almost to its melting point and is sufficiently tough at the temperatures used for pyrolysis of hydrocarbons. (T29, AY)

227-T. New Blading Alloy Improves Turbine Performance. P. M. Unterweiser. *Iron Age*, v. 178, Sept. 6, 1956, p. 100-101.

Metallurgical research has produced a specially designed material which has high strength and excellent damping capacity, even at 1200° F. (T25, Ni, Cr, Fe, Co)

228-T. (Russian.) **Selecting Metals and Alloys for the Fuel Systems of Engines.** A. A. Gureev and Z. A. Sablina. *Avtomobil'naia i Traktornaia Promyshlennost'*, no. 6, June 1956, p. 23-24.

Gum formation in gasoline engines can be affected by certain metals and alloys used in constructing the combustion chamber and fuel system. (T21)

229-T. (Book.) **Nuclear Fuels.** David H. Gurinsky and G. J. Dienes, editors. 364 p. 1956. D. Van Nostrand Company, Inc., 120 Alexander St., Princeton, N. J. $7.50.

Compact picture of present status of nuclear fuels. Organized in three sections; metallurgy of uranium and thorium; radiation effects; solid and fluid fuels. Provides engineering principles and applications of specific systems. (T25, Th, U)

230-T. (Book.) **Progress in Nuclear Energy. v. I. Process Chemistry. Series III.** F. R. Bruce, J. M. Fletcher, H. H. Hyman, and J. J. Katz, editors. 407 p. 1956. Pergamon Press Ltd., 4 & 5 Fitzroy Square, London, W.1, England.

Selected papers on analytical, separating, and metallurgical processing methods employed by major countries in their atomic energy programs. (T25, C general, U, Th)

231-T. (Book.) **Progress in Nuclear Energy v. I. Technology and Engineering. Series IV.** R. Hurst and S. McLain, editors. 420 p. 1956. Pergamon Press Ltd., 4 and 5 Fitzroy Square, London, W.1, England.

Heavy-water production processes; production and properties of graphite and beryllia; liquid metals; heat transfer, reactor chemistry and corrosion of reactor materials. (T25, R general)

232-T. (Book—German.) **Aluminum Beam Structure.** Fritz Stüssi. 198 p. 1955. Springer-Verlag, Berlin.

Construction material and its properties. Joint materials. Special strength problems and stability problems. Construction of aluminum structures. (T26, Al)

V
Materials
General Coverage of Specific Materials

159-V. Hardenable Silver Alloy. Winthrop Warren. *Materials & Methods*, v. 44, Aug. 1956, p. 106-107.

Irreversible hardening of silver-magnesium-nickel alloy provides high hardness and low creep rate at elevated temperatures. Properties favor electronic and electrical applications. (Ag)

160-V. Tool Life Increased With New Steel. J. Y. Riedel. *Metal Progress*, v. 70, Aug. 1956, p. 69-71.

A new chromium-molybdenum toolsteel has been developed with improved shock resistance and service life in both hot and cold work applications. (TS)

161-V. Zirconium, Its Production and Properties. *U. S. Bureau of Mines Bulletin* 561, 1956, 180 p.

Ores, reduction processes, melting, fabrication, alloys, uses, availability, analytical procedures. (Zr)

162-V. (English.) **The Effect of Nb, V, Ti and N_2 on the Properties of Ni-Cr (20-15%) System and Ni-Cr-Co (20-15-15%) System Heat Resisting Steel for Gas Turbines.** Sadao Koshiba and Tsuneo Kuno. *Hitachi Review*, no. 13, May 1956, p. 19-25, 18.

Tests involved forgeability, aging hardness, microstructure, mechanical properties at high temperatures, resistance to oxidation, and creep limit. (F22, N7, M27, Q general, R2, Cb, V, Ti, SS-h)

163-V. Study of the Effect of Gases on the Melting, Casting, and Working of Palladium. R. H. Atkinson. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, sec. 2, Aug. 1956, p. 1029-1035.

Experimental procedure; observations on density and hardness, reducing gases as deoxidizers. (Pd)

164-V. Experimental Magnesium Alloys Containing Nickel, Manganese, Lithium, and Aluminum. J. A. Rowland, C. E. Armantrout and D. F. Walsh. *U. S. Bureau of Mines, Report of Investigations* 5250, July 1956, 21 p.

The magnesium-nickel and magnesium-nickel-manganese alloys failed to develop superior mechanical properties and were very low in resistance to corrosion. Magnesium-lithium alloys offer possibilities warranting further investigation. (Mg)

165-V. (Italian.) **Principal Alloying Elements Added to Cast Iron and Steel; Their Influence and Use.** *Fonderia*, v. 5, no. 5, May 1956, p. 254-255, 257, 259; no. 6, June 1956, p. 303 + 4 pages.

Effects of lead, copper, columbium and oxygen. (To be continued.) (CI)

166-V. (Russian.) **Cast Carbon Steel With Boron Added.** Ia. E. Goldshtein, L. L. Piatakova and O. D. Zhizhakina. *Vestnik Mashinostroeniia*, v. 36, no. 7, July 1956, p. 23-27.

Small quantities of boron added to low-carbon, medium-carbon, chromium, chromium-manganese and chromium-nickel steels improve the tempering properties, and reduce the quantities of alloy elements needed, especially nickel, molybdenum, chromium and manganese. (AY)

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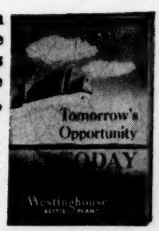

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CASTING ENGINEER: Position open in large nonferrous foundry for engineer with a background in foundry practices. Duties will include working out of laboratory with production foundry on the development of process and related problems. Excellent starting salary and company benefits. Write stating full particulars, including salary requirement and availability. All replies held in strict confidence. Box 10-135.

PHYSICAL METALLURGIST: Position open for recent engineering or science graduate with strong background in theoretical metallurgy. Duties will include development of projects in alloy research and process application. Excellent starting salary and fringe benefits. Please write stating full particulars, including salary requirement and availability. All replies held in strict confidence. Box 10-140.

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METALLURGICAL ENGINEER: Canadian, B.A. degree from Laval, M.S. from McGill. Two years experience in aircraft heat treatment, metallography, physical metallurgy, welding and soldering of electroplating, photomicrography. Experience as chief chemist and metallurgist. Wishes to locate as metallurgist in U. S. Box 10-5.

METALLURGIST: Age 36, M.S. degree, 14 years diversified experience in plant control, research, teaching. Seeking permanent position with progressive company as technical director, research director or chief metallurgist. Excellent work record and references. Box 10-10.

METALLURGIST ENGINEER: Military service complete in May 1957. Was production metallurgist and project engineer for ferrous metallurgical heat treatment and cold forming programs at government arsenal for two years. One year general engineering experience before army. Desires position in production engineering or process development. Age 24, married, B.S. degree. Box 10-15.

CHIEF METALLURGIST: B.S. degree, metallurgical engineering, age 47, wants position in area free of hay fever. Experience in aluminum and brass foundry, brass mill and fabrication. Available on 30-day notice. Box 10-45.

METALLURGICAL ENGINEER: B.S. degree, family, age 35. Five years experience in research and development in aluminizing and galvanizing, two years in heat treating

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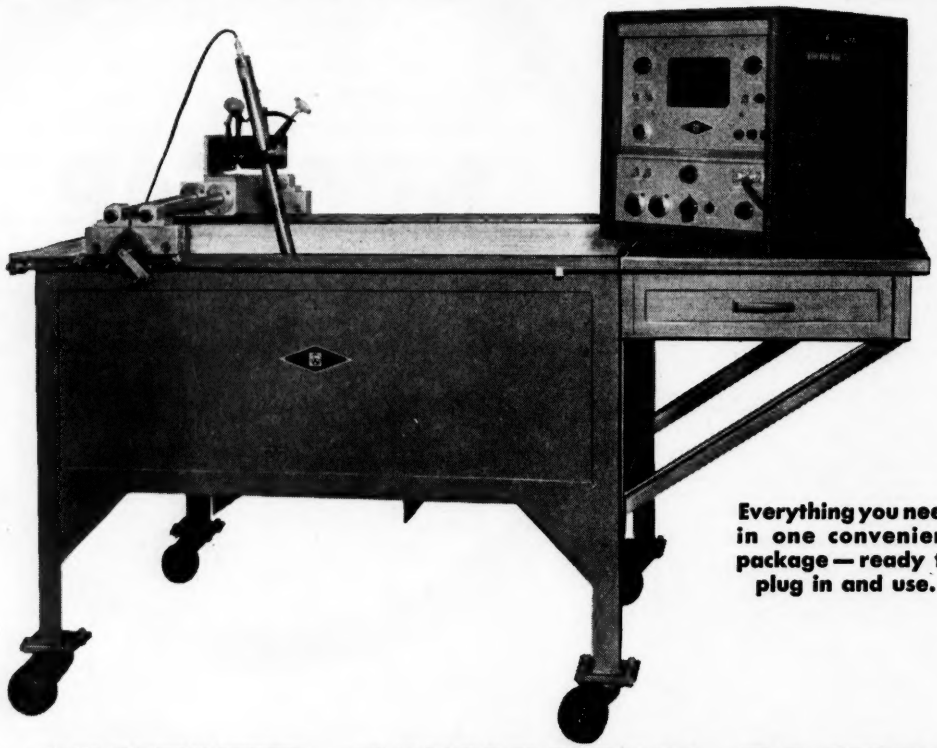

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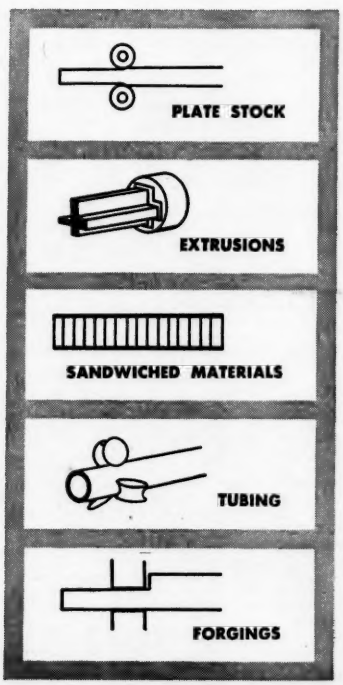

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and metallography. Desires responsible position in production or development. Will relocate. Box 10-20.

SALES METALLURGIST: B.S. degree in metallurgy, Penn State, past chairman local A.S.M. chapter. Eight years metallurgical work, past ten years selling specialty steels. Currently employed, married, family, free to move. Box 10-25.

TOOL AND DIE HEAT TREAT SPECIALIST: Fifteen years experience in heat treating all types of tool and die steels and high speed steels. Experienced in carburizing and nitriding. Married, two children, midwest preferred, but will consider relocation. Box 10-30.

METALLURGIST: Dane, wishes to come to U. S. Graduate of Technical University in Denmark, M.S. in chemistry, with major in metallurgy and corrosion. Lieutenant in Royal Danish Navy, heading laboratory for military research and in charge of five chemical engineers. Service to terminate January. Age 25, married. Box 10-60.

METALLURGIST: B.S. degree, age 32, married. Eight years diversified experience in ferrous metallurgy, including chemical analysis, heat treatment, material specifications, failure analysis and quality control. Desires responsible position with potential utilizing steel forging and automotive background. Cleveland, Northeastern Ohio area preferred. Box 10-65.

SALES—MANAGEMENT: B.S. degree, age 39, married. Academic studies in business administration and the sciences. Tool and die maker by trade and nine years experience in technical metal and foundry alloy sales, with heavy accent on heat and corrosion resistant materials. Desires position that will develop into executive capacity. Currently in Midwest, but will relocate. Box 10-70.

PHYSICAL METALLURGIST: Ph.D. degree, age 31, family, with five years of diversified supervisory experience in fundamental and developmental research. Three years of university teaching and academic research. Publications. Intends to relocate. Prefers West Coast. Salary from $12,000 to $15,000. Box 10-90.

METALLURGIST: B.S. in metallurgy, M.I.T., age 39, family. Desires supervisory position directing metallurgical research and development. Varied laboratory experience for 16 years. Wide knowledge of physical properties, failure analysis, metallography, salt baths, heat treatment, carburizing, hardenability, steelmaking processes. Has been responsible for planning, budgeting and supervision of development programs. Experienced in report writing and oral presentations. Several publications. Prefers New England or New York State. Present earnings in excess of $10,000. Box 10-95.

METALLURGICAL ENGINEER: B.S. degree, University of Michigan, age 40, family. Fourteen years experience in specification, development and control of metallurgical materials and processes in automotive industry, member of technical societies and committees. Lecturer and author of numerous publications on gas carburizing, heat treating, selection of materials and processes, alloy steels. Minimum salary $12,000. Box 10-100.

METALLURGICAL ENGINEER: Age 26, single, graduate University of Cincinnati, post graduate fellowship study in South America. Four years varied experience, largely in analysis of service failures and research. Very detailed knowledge of Colombian metals industry, linguist, publications, both Spanish and English. Can handle men. Seeks position as technical manager or advisor on staff of large company with branch offices in Latin America. Overseas placement preferred, though not essential. Box 10-145.

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B.S. or M.S. degree in metallurgy with powder metallurgy background and two or more years' experience for:
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Development and technical service work, including consultation, selection of materials and failure analysis.

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WRITE, outlining qualifications and experience, to: A. N. Hurst, Personnel Department, Dept. 1710, Product Development Laboratory,

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Box 10-130, Metals Review

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To supervise welding development research projects, investigate shop problems resulting from new welding procedures and to prepare research reports.

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